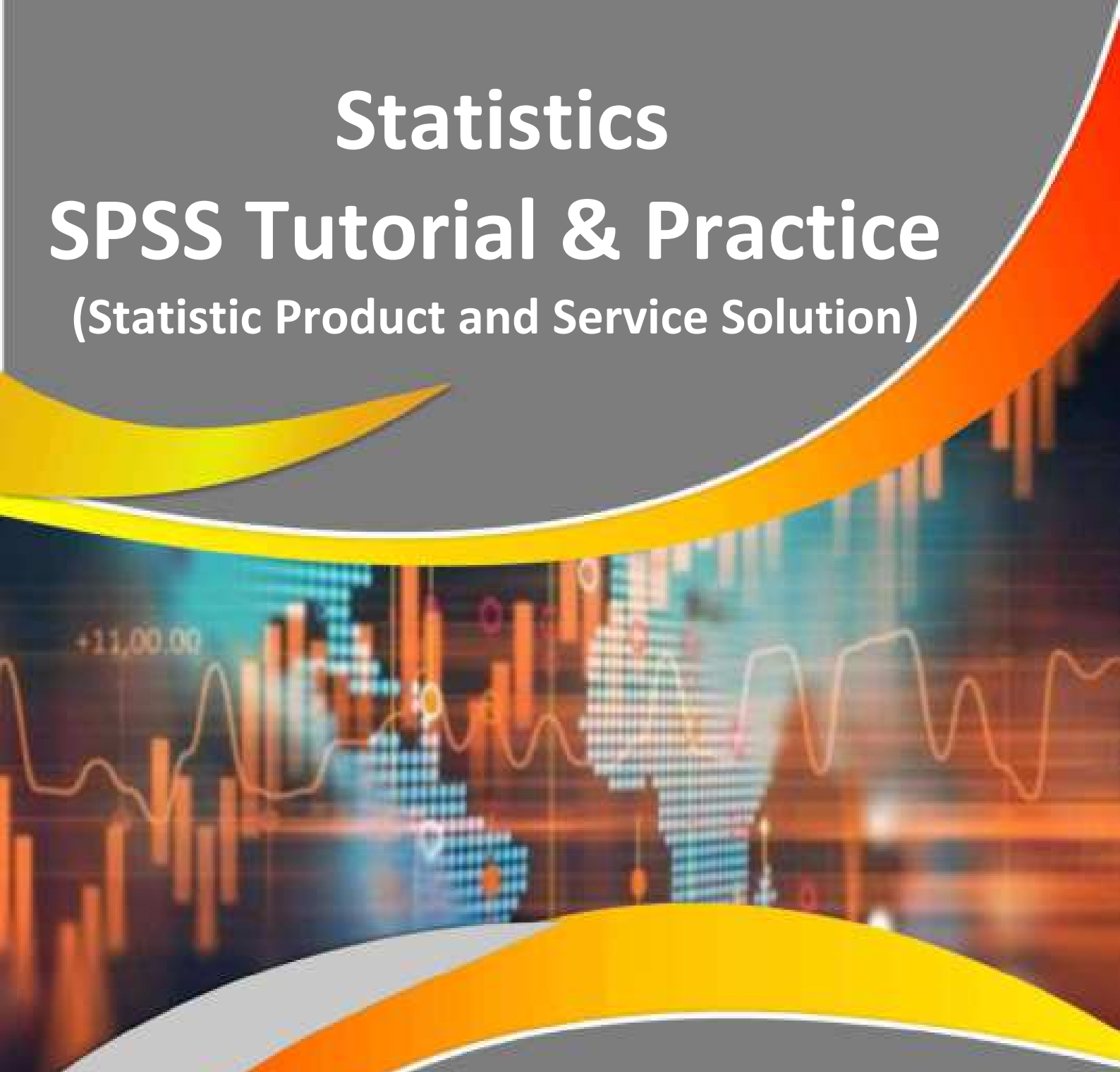
Statistics
SPSS Tutorial & Practice
(Statistic Product and Service Solution)



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FOREWORD

Alhamdulillah, thanks to Allah SWT, with His grace and permission, the book of Statistics SPSS Tutorial & Practice (Statistic Product and Service Solution) to support learning activities in universities, especially in the Faculty of Education / Universitas PGRI Semarang can be realized.

Statistics course is one of the compulsory subjects for students. This is because the Statistics course provides students with scientific knowledge and abilities in order to complete final assignments in the form of theses, especially those using a quantitative research approach. However, currently the perception of most students that statistics courses is a "scary" course for students. This book tries to give an idea that studying statistics is an easy thing and even tends to be fun. This book provides applicable examples in solving statistical problems that directly touch on problems in research implementation by using SPSS software application.

We hope this book can complement the existing statistics books, as well as reading material and adding insight for students and other readers. Finally, to all those who have helped in the preparation of this book, I would like to express my deepest gratitude. Hopefully this book is useful for students and readers who are interested in studying Education Statistics. It is fully realized that this book is still incomplete and has many shortcomings. For that, through this opportunity we ask for input for further improvement. For suggestions and contributions from dear readers, we express our gratitude.

Semarang, August 2022

Writers

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1. INTRODUCTION

A. Understanding Statistics

The first definition of statistics is "the study of statistics," while the second definition is "measures collected or derived from the sample." A collection of facts, figures, or non-numbers presented in tables and/or diagrams to demonstrate or characterize an issue is what Andy Field (2005) defines as statistics. In the context of statistics, "measuring" refers to the depiction of a set of data about something. This metric is created by doing calculations on a subset of data that has been chosen from the entire problem. Statistics, according to Franzese & Iuliano (2018), is the understanding of gathering, processing, or analyzing data as well as making inferences from that data.

The term "statistics" refers to a collection of numerical data about future events (Wagner, 2015). The term "accident statistics" is used in the sector of transportation, and statistical data is utilized in the context of education. Many areas of life continue to employ statistics as numerical data.

The terms statistics and quantitative data are distinct in the realm of study. Statistics is defined as a way of processing and evaluating quantitative data, whereas quantitative data is defined as data in the form of numbers. In this instance, statistics, according to Kim et al., (2018), is a technique for gathering, processing, presenting, analyzing, and interpreting numerical data. The approach must be able to offer methods for not only gathering, processing, presenting, and evaluating data, but also for using the results of the calculation of samples drawn at random from the community in question to infer features of specific populations.

According to Ave (1999), statistics is the discipline of gathering, organizing, analyzing, and interpreting numerical data with the aim of improving decisions in the face of uncertainty. In this context, statistics is defined as the discipline of gathering, assembling, analyzing, and interpreting numerical data in order to improve decision-making under uncertain conditions.

According to Vanlalhriati & Singh (2015), statistics are a set of procedures and guidelines for gathering, processing (analysis), and drawing conclusions from numerical data under specific presumptions. In accordance with this last view, Singpurwalla & Lai (2020) makes the case that statistics are a set of scientific techniques designed to gather, assemble, display, and analyze research data as numerical data. Additionally, statistics are anticipated to offer a trustworthy foundation for making wise selections.

According to Rasch et al., (2012), statistics is a set of techniques that address the following topics: (1) how to gather data that can provide the best information; (2) how to summarize, process, and present data; (3) how to analyze a set of data so that certain strategies emerge from the analysis; (4) how to draw conclusions and suggest decisions that should be taken on the basis of existing strategies; and (5) how to estimate the likelihood of errors when relying on existing strategies.

B. Descriptive Statistics and Inferential Statistics

In the field of research, statistical terms are distinguished from quantitative data. Statistics is defined as a way of processing and evaluating quantitative data, whereas quantitative data is defined as data in the form of numbers. According to Johnson, (2014), statistics is a technique for gathering, handling, presenting, analyzing, and deciphering quantitative data. The approach must be able to offer methods for not

only gathering, processing, presenting, and evaluating data, but also for using the results of the calculation of samples drawn at random from the community in question to infer features of specific populations.

In accordance with this last view, Kim (T. K. Kim, 2017) makes the case that statistics are a set of scientific techniques designed to gather, assemble, display, and analyze research data as numerical data. Additionally, statistics are anticipated to offer a trustworthy foundation for making wise selections.

Numerous methods for analyzing quantitative data have been developed by statistics. Descriptive statistics and inferential statistics make up the two main categories of quantitative data analysis approaches.

1. Descriptive Statistics

In order to provide an organized, succinct, and clear picture of a phenomenon, state of events, or other phenomenon from which understanding or meaning can be inferred, descriptive statistics examine the methods for gathering, compiling, presenting, and analyzing research data in the form of numbers. certain. Tables, graphs, the means, medians, modes, measurements of data variance, and other statistical techniques that solely seek to understand the description or trend of the data without attempting to generalize are categorized as descriptive statistics (Franzese & Iuliano, 2018).

According to Vanlalhriati & Singh (2015), descriptive statistics are those that are used to describe or analyze a statistic of study findings, but they are not utilized to draw broader inferences or generalizations. Sugiyono went on to say that descriptive statistics will be used in research without a sample. Similarly, descriptive statistics are utilized in research that uses a sample but does not attempt to draw generalizations about the population from which the sample was drawn.

The focus of the research on descriptive statistical analysis as it was characterized by Wilmot & Mansell (2014) is as follows:

a. Frequency distribution and measurement of statistical values such as measurement of central value, dispersion, skewness and kurtosis, and graphs such as polygons, histograms and gives.

b. Index number.

c. Time series or time series.

d. Simple regression coefficient and correlation coefficient.

The same thing is explained by Everitt & Skrondal (2006) regarding the scope descriptive statistical studies, namely (Jackson, 2009; Rusydi & Fadhli, 2018; Vanlalhriati & Singh, 2015):

a. Data presentation in the form of tables, such as frequency distribution tables, single tables, and contingency tables.

b. The presentation of data as graphs, including bar charts, line charts, pie charts, scatter plots, map plots, symbol diagrams, and diagrams of the frequency distribution of the table, such as the histogram, frequency polygon, and provide.

c. Center-and-location measures include mean, median, mode, variance, standard deviation, quartiles, deciles, and percent.

d. Dispersion or deviation measurements such the standard deviation, variance, mean deviation, and range.

e. The slope of the curve and the sharpness of the curve distribution make up the data distribution model.

f. Index number.

g. Times series / time series or periodic data.

2. Inferential Statistics

Inferential statistics are those that analyze or develop methods for inferring information about population traits from quantitative data gathered from research samples (Rusydi & Fadhli, 2018). Generalization or induction is the process of drawing generalizations about the features of a population based on sample data drawn from the community. As a result, inductive statistics and inferential statistics are synonyms. Inferential statistics offers specific guidelines for formulating or producing forecasts and estimates in addition to the generalization function (Field, 2005; Franzese & Iuliano, 2018; Garth, 2008; Jackson, 2009; Oliver-Rodríguez & Wang, 2015; Singh, Kumar, 2006; Vanlalhriati & Singh, 2015).

Gerald (2018) explain the study's inferential statistical analysis's purview as follows:

a. probability.

b. Theoretical distribution.

c. Sampling and sampling distribution.

d. Estimated price parameters.

e. Testing of hypotheses, such as the chi-square test and the analysis of variance.

f. Prediction using regression analysis.g. Correlation and significance test.

h. Time series or time series.

i. Simple regression coefficient and correlation coefficient.

Furthermore, Gerald (2018) explains the scope of the study of inferential statistics as follows:

a. Analysis of the test requirements, including the normalcy test, homogeneity test, linearity test, and multicollinearity test.

b. Association hypothesis testing using the canonical test, path analysis test, regression test, and correlation test.

c. Comparative hypothesis testing using the t test, 2-group difference test, Tucket test, analysis of variance, analysis of covariance, multivariate analysis of variance, and multivariate analysis of covariance, among other methods.

D. Parametric and Non-Parametric Statistics

Parametric statistics and non-parametric statistics make up the two categories of inferential statistics that seek to generalize. A method of data analysis known as parametric statistics calls for certain demographic properties, such distribution normality and data homogeneity, to be assumed or tested. While non-parametric statistics is a quantitative data analysis technique that disregards the parameters and does not call for assessment of population features (Friedrich et al., 2017; Garth, 2008; T. K. Kim, 2017; Oliver-Rodríguez & Wang, 2015; Orwa et al., 2014).

According to the assumptions and the kind of data to be evaluated, Jackson (2009) describes how to utilize parametric and nonparametric statistics in this situation. Numerous suppositions must be met for parametric statistics to work. The underlying presumption is that the data being studied must have a normal distribution. The data of two or more groups being evaluated must also be homogeneous in order to use one instrument, and regression requires that the linearity assumption be met. Nonparametric statistics do not rely on a lot of presumptions, such as that the data being studied are normally distributed.

Additionally, Garth (2008) adds that nonparametric statistics are primarily used to evaluate nominal or ordinal data from populations that are free of distribution, while parametric statistics are primarily used to examine interval or ratio data collected from normally distributed populations (not necessarily normal).

Quantitative data analysis has two distinct goals in terms of research objectives: figuring out how variables relate to one another and figuring out how two or more sample groups differ from one another. Correlation and regression analysis were used to ascertain the link between the variables, while comparative analysis was used to ascertain the distinction between two groups of samples or more (Chakrabarty, 2018; Ioan, 2016; Johnson, 2014; Singpurwalla & Lai, 2020; Vanlalhriati & Singh, 2015).

B. Types of Research Data

In quantitative research, data analysis focuses on the values of the collected data. Sometimes data values take the shape of numbers, while other times they do not (Ave, 1999; Chakrabarty, 2018; Oliver-Rodríguez & Wang, 2015; Sharma, 2017). The worth of the numerical data, such as the significance of the learning outcomes data (6, 7, 5), the degree of intelligence (100, 110, 105), and a score indicating students' level of interest in learning (30,25,45). The worth of the student's gender (male or female), as well as the worth of their ethnicity (Javanese, Sunda, Bugis, Betawi).

The target of study typically comprises of components or elements known as research data. Data is a concept that demonstrates varying symptoms; the used symptoms change depending on the level or magnitude (Everitt & Skrondal, 2006; Horton & Switzer, 2005; Orwa et al., 2014). Symptoms that differ by type or classification, such as gender, which has male and female forms. Additionally, there are other jobs for farmers, traders, fishers, and others.

Different types of symptoms are referred to as discrete data or nominal data. Because other nominal data are distinct from one another, nominal data are referred to as discrete data. Symptoms that change depending on their severity or intensity, such as

variations in wealth, IQ, height, weight, and the like (Garth, 2008; Rusydi & Fadhli, 2018; Vanlalhriati & Singh, 2015).

Continuum symptoms, also known as continuum data, are symptoms that vary depending on the level. The values of the continuum data are not clearly distinguished. The continuum data value is essentially a continuum. There are three categories of continuum data: ordinal, interval, and ratio (Everitt & Skrondal, 2006; Field, 2005; Franzese & Iuliano, 2018; Jackson, 2009). Therefore, quantitative research data is split into four groups based on the nature of the data value, namely:

1. Nominal Data

Qualitative descriptive data is what nominal data is. Nominal data values are presented as classifications, but there is no level of differentiation between the classifications. For instance, the value of tribal data from Java, Sunda, Madura, and Bangka is classified without level (Franzese & Iuliano, 2018; Rusydi & Fadhli, 2018; Wagner, 2015). Even though numbers are used for nominal data values, they are just employed as symbols to make analysis easier and nominal data values do not take the shape of numbers. Rusydi & Fadhli (2018) uses the example of "A researcher dealing with data relating to the sex of pupils (female and male)" to demonstrate his point.

Researchers must convert the data into numbers in order to apply statistics in their analysis. If the researcher chooses the numbers 1 and 2 as symbols for female students and male students, respectively, then those numbers represent the genders' initials. The researcher will henceforth always be addressing numbers 1 and 2. Given that these numbers are merely symbols or codes, number 2 in this instance does not imply that number 1 is greater. The numbers are included as a nominal scale data group as

long as they are only used as symbols by the researcher (Orwa et al., 2014; Rusydi & Fadhli, 2018; Vanlalhriati & Singh, 2015).

2. Ordinal Data

Ordinal data, as opposed to solely nominal data, also indicates categorisation. Ordinal data classification essentially demonstrates that there are levels between one another. For instance, information on the degree of education among young people in a particular location, including Elementary/MI, SMP/MTs, and SMA/MA. Student rankings (rank 1, 2, 3, etc.) are another example of an ordinal (Franzese & Iuliano, 2018; Rusydi & Fadhli, 2018; Singh, Kumar, 2006; Wagner, 2015).

These two examples demonstrate that ordinal data can have a numerical value, but it may not always have a numerical value. Ordinal data has two features: (a) it has a classification or classifications, and (b) its value denotes the presence of levels. However, neither the level nor the level of the difference is constant or has a set interval (Everitt & Skrondal, 2006; Vanlalhriati & Singh, 2015).

Irianto Garth (2008) provides the following illustration of the situation involving ordinal data: "A researcher is presented with data pertaining to student semester exam results stating that (1) student A is the first place winner, (2) student B is the second winner, (3) student C is the third place winner, and so on. Although the number 1 here has a higher value than the numbers 2 or 3, this scale is unable to definitively distinguish between A, B, and C's abilities (Rusydi & Fadhli, 2018; Wagner, 2015). The first place winner does not necessarily mean that they are twice as talented as the second place winner or three times as talented as the third place winner. Additionally, it's unlikely that the gaps in talents between the students who placed first and second and the children who placed second and third are the same.

As a result, even though the numbers used as a stand-in have the same range, the range of students' skills for each winner is not always the same (fixed). The best use of numbers is not necessarily dictated by tiny numbers. Thus, the researcher might proceed on the premise that a higher number is preferable. When describing the outcomes of statistical analysis, attention must be taken to take into account the amount of the data as well as the location of the numbers as a proxy for good or bad (Field, 2005; Oliver-Rodríguez & Wang, 2015). From coding to explanation, characteristics must be consistent.

3. Interval Data

Numbers are used to represent the values of interval data, which are categorized as continuum data. The values in the interval data represent the findings of measurements, such as the findings of assessing intelligence level, learning interest, and learning outcomes (Ave, 1999; Everitt & Skrondal, 2006; Friedrich et al., 2017; Wagner, 2015). Numbers (120, 110, 90, 115, etc.) are used to express the level of intellect (IQ).

The measurement instrument's units of measure must be equally spaced apart, or at least close to it, in order for the measurement to satisfy one of the requirements. In this instance, measurements in the exact sciences, such as biology, chemistry, and physics, typically have a higher level of precision than measurements in the social sciences and education (H. Kim et al., 2018; Parthiban & Gajivaradhan, 2016). In the social sciences, it may be more appropriate to remark that the units of measurement are close to the same, but measurements in the precise field can typically be carried out using equidistant units of measure (relatively equidistant).

Data that is interval scaled is referred to as interval data. The interval scale includes three features, including (a) the existence of a classification or classification, (b) the value of the data indicating the existence of a level, and (c) the equidistant nature of the units of measurement (Ave, 1999; Everitt & Skrondal, 2006).

Rusydi & Fadhli (2018) provides the following illustration pertaining to interval data: The range of student grades that researchers must deal with is 0 to 10. From 0 to 100 Celsius is the temperature range. In this instance, students who receive a score of 8 have double the aptitude of students who receive a score of 4, and the heat of the air at 15 degrees Celsius is equal to that at 30 degrees Celsius. But when pupils receive a score of 0, it does not necessarily suggest that the air is completely devoid of temperature or that they have no knowledge of the subject matter being examined. This continuous (fixed) range between levels enables the interval scale to constantly give a general picture of the thing being evaluated.

4. Ratio Data.

Values from ratio data measurements are more accurate than those from interval data. Measurement findings utilizing equidistant units of measure that have absolute or obvious zero points are known as ratio data values (Allen, 2017; T. K. Kim, 2017).

The issue of the zero point in the measuring process is what distinguishes interval data from ratio data. Social science measurement techniques typically lack the accuracy needed to pinpoint the zero point. The properties of the measurement device, which are internal to the research subject, are mostly to blame for this. It is impossible to determine that a student's learning objectives didn't exist at all, even if they were all erroneously answered by them (score = 0). As a result, measures in the field of

education typically only yield results at the interval scale level (interval data) (Garth, 2008; Jackson, 2009; Wilmot & Mansell, 2014).

The values of ratio data are expressed numerically. The ratio data figures indicate that there is a level, and these values may be compared because they have an absolute zero point. Thus, ratio data has four characteristics: (a) it has a classification or classification, (b) the data value shows a level, (c) the unit of measurement is equidistant, and (d) it has an absolute zero point (Everitt & Skrondal, 2006; Ostertagová & Ostertag, 2013; Singpurwalla & Lai, 2020).

C. Types of Research Variables

1. Independent variable.

Independent variables are also known as stimulus variables, input variables, predictor variables, and antecedent variables. It is commonly referred to as the independent variable in Indonesian. The independent variable is the variable that causes the dependent variable to occur or change (the dependent variable). So the variable that influences is the independent variable. The independent variables in statistical investigations of structural equation modeling (SEM) or structural equation modeling are referred to as exogenous variables (Parthiban & Gajivaradhan, 2016; Rusydi & Fadhli, 2018; Singpurwalla & Lai, 2020).

2. Dependent variable.

The response, output, criteria, and consequence variables are all names for the dependent variable. It is frequently referred to as the dependent variable in Indonesian material. The dependent variable is the one that is affected by or results from the independent variable. The independent variables in statistical investigations of

structural equation modeling (SEM) or structural equation modeling are referred to as endogenous variables. Each independent and dependent variable is always in pairs, such as Leadership and Work Productivity (Leadership as the independent variable, Work Productivity as the dependent variable), Heat and Expansion of Length (Heat as the independent variable, long expansion time as the dependent variable) (Ioan, 2016; Jackson, 2009; Singh, Kumar, 2006; Vanlalhriati & Singh, 2015).

3. The moderator variable.

The link between the independent and dependent variables is influenced by the moderator variable, which can either increase or diminish the association. It's common to refer to this variable as the second independent variable. For instance, if a teacher and students have a good communication, their relationship will be more intimate (Rusydi & Fadhli, 2018; Singh, Kumar, 2006). A moderator variable that strengthens the association in this example is the a good communication. But on the contrary, the teacher and students' interaction will be more tenuous if there is a "third party". In this case the third party is the moderator variable that weakens the relationship. Another example is the relationship between ability and learning outcome will be higher if the motivation is high, and the relationship between ability and learning outcome will be lower if the motivation is low. Motivation as moderator variable.

4. Intervening variables.

The relationship between the independent and dependent variables can theoretically be strengthened or weakened by intervening variables, which are not observable. For instance, intelligent students will typically have high test scores, but occasionally

intelligent kids will also have low test results. It was discovered that the student had been harmed and aggravated while attempting the exam questions. There are intervening variables that are still challenging to quantify, such as heartache and frustration (Everitt & Skrondal, 2006; Singh, Kumar, 2006).

5. Control variables.

The control variable is a variable that is kept constant or under control in order to have no impact on the primary variables under investigation. If the researcher plans to do research, particularly by employing experimental procedures that involve comparisons, the control variable will be chosen by the researcher. For instance, researchers aim to compare the typing speed of high school graduates versus those with a vocational degree (Field, 2005; Ioan, 2016). It is important to identify the control variables for this study, which include the same typed script, typewriter, workspace, and time used. In order to complete the previous sentence about the categories of variables, Rusydi & Fadhli (2018) also offers the following additional explanations about the sorts of variables:

1. Confounding variables.

Independent variables that are researched but not discovered as confounding factors avoid being controlled or regulated. Due to the presence of these confounding variables, the research findings are flawed and can lead to the incorrect research hypothesis being accepted (Oliver-Rodríguez & Wang, 2015; Sharma, 2017; Singh, Kumar, 2006; Solutions, 1918).

2. An antecedent variable.

An antecedent variable is a variable that affects the independent variable. In a study this variable is usually expressed in the implications of a study (Field, 2005).

3. Covariate variables.

Covariate variables are independent variables whose existence is restricted and statistically controlled to prevent tampering with the findings of the study. Therefore, the covariate variable itself serves as a control variable; the only difference is that statistical methods are used to carry out the control or control. The context must be assessed in light of the underlying theoretical ideas as well as the findings of empirical observations at the research site in order to be able to determine the positions of the independent, dependent, moderator, intervening, control, and other variables. This makes it necessary to do a theoretical study and a preliminary study on the object to be investigated before the researcher decides what variables to study (Everitt & Skrondal, 2006; Field, 2005; Solutions, 1918; Wagner, 2015).

2. OPERATING SPSS PRACTICUM

SPSS (STATISTICAL PROCEDURE AND SERVICE SOLUTION)

In this first practice, it will be discussed on how to start operating the program, enter data, store data, call / open data and terminate the program (Everitt & Skrondal, 2006; Field, 2005; Garth, 2008; Gerald, 2018; Oliver-Rodríguez & Wang, 2015; Wagner, 2015).

1. **Starting SPSS**

   If you are going to start SPSS 10.0 for Windows, the steps you should take are:

   a. Click **START** menu, then select Programs.

   b. Select SPSS items, e.g SPSS 10.0 for Windows, the following picture will appear:

   In the view there are two windows or windows. The first is the SPSS data editor and the second is some menu option that can be used in further analysis related to data management.

2. MAIN MENU

Some of the main menu items that are important in SPSS are as follows:

a. File; it contains management or management facilities and data files

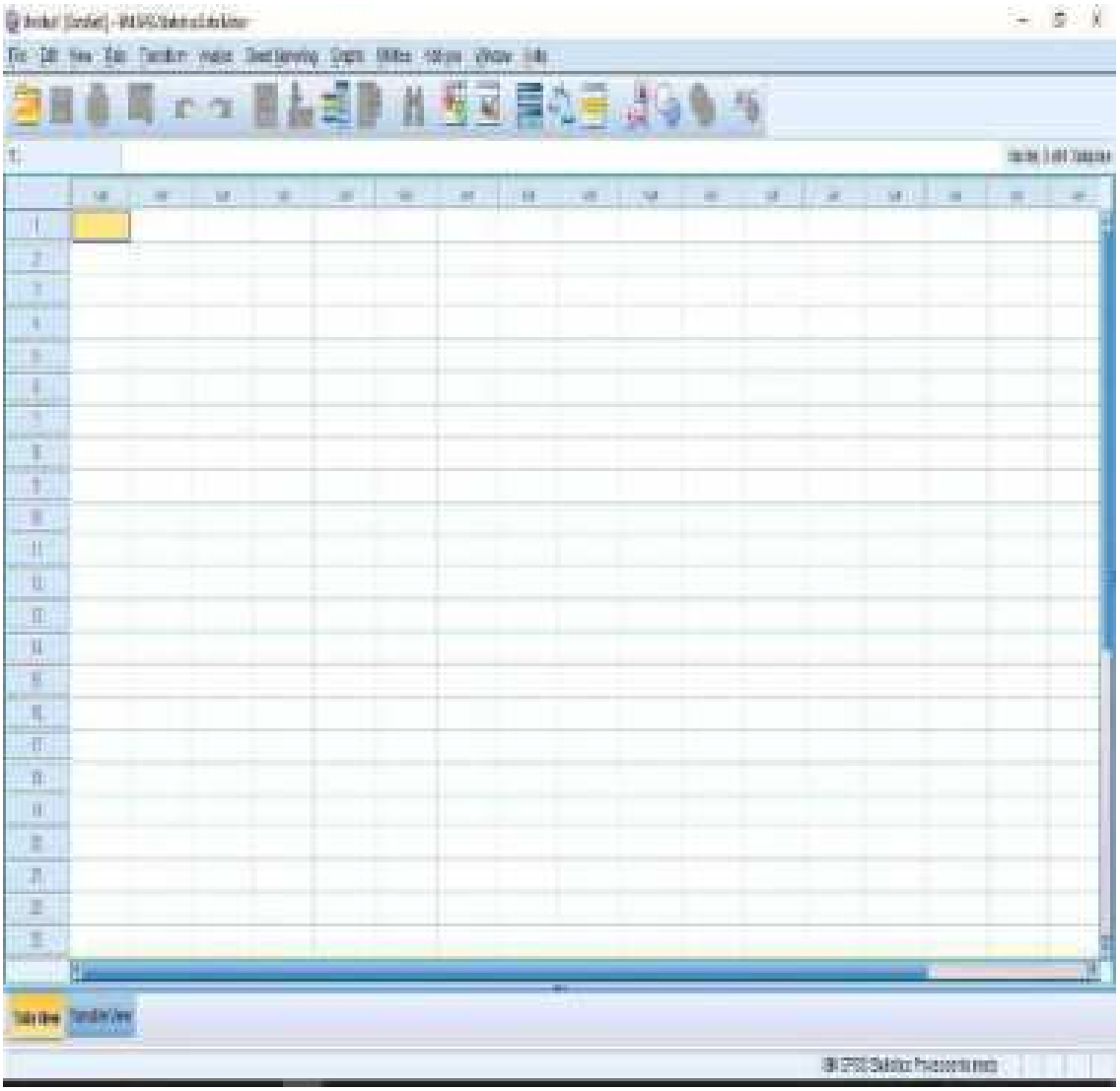
b. Transform; it is used to manipulate data

c. Analyze; it is used for data analysis

d. Graph; it is used to visualize data

e. Utilities; it is used in connection with utilities in SPSS 10.0.

The menus you can see in Figure 2 below:



3. DEFINITION OF VARIABLES

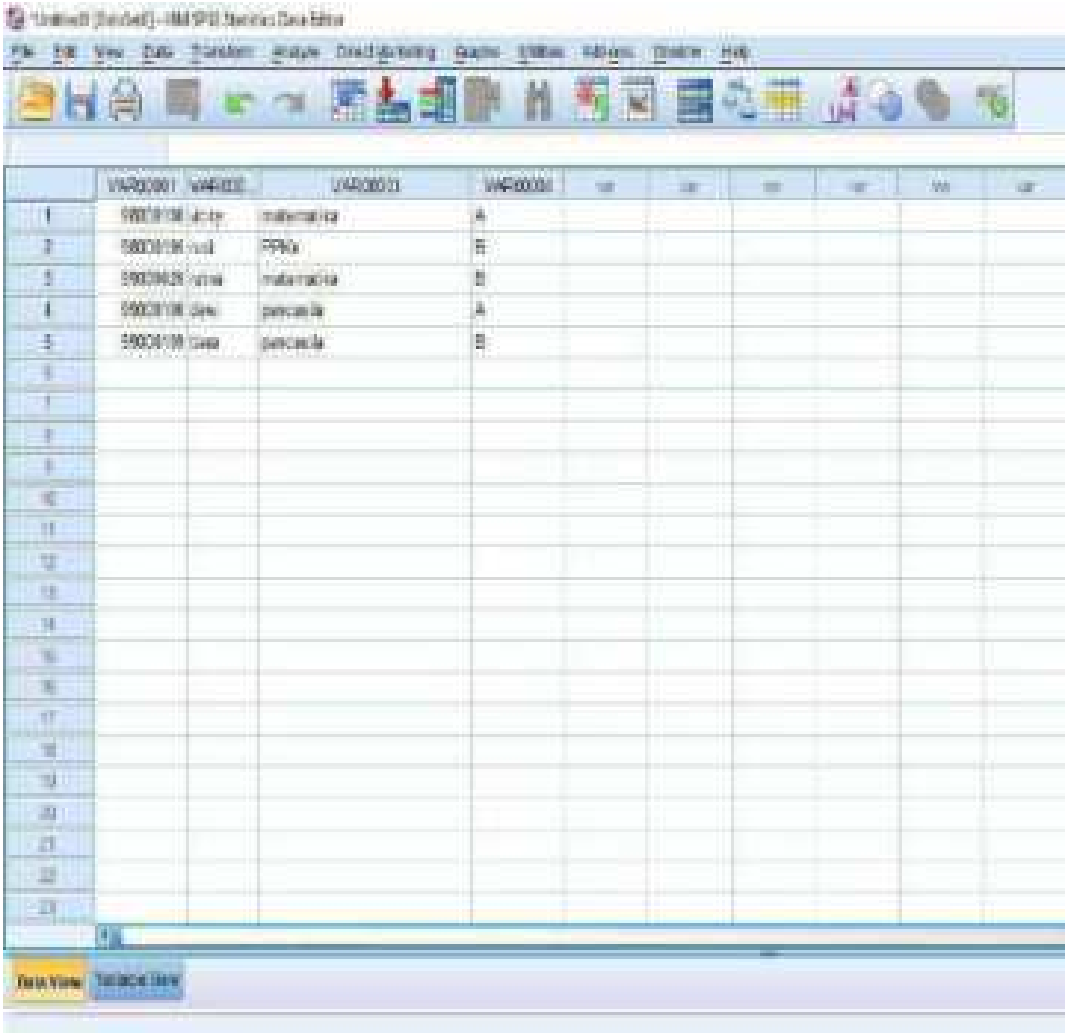
In the sheet variable view (in the bottom left corner), it is used for defining variables that include:

a. Name: to name the variable to be inserted into the data view field
b. Type: to format data according to the type of data entered, eg numerical (numbers, whether using decimal or not); string (non digits or text or characters)
c. Width: to set the column width of the data.
d. Decimal: to set the number of numbers behind the comma.
e. Labels: to give explanation of variable or data f. Align: to adjust data flattening, ie left, right or center.

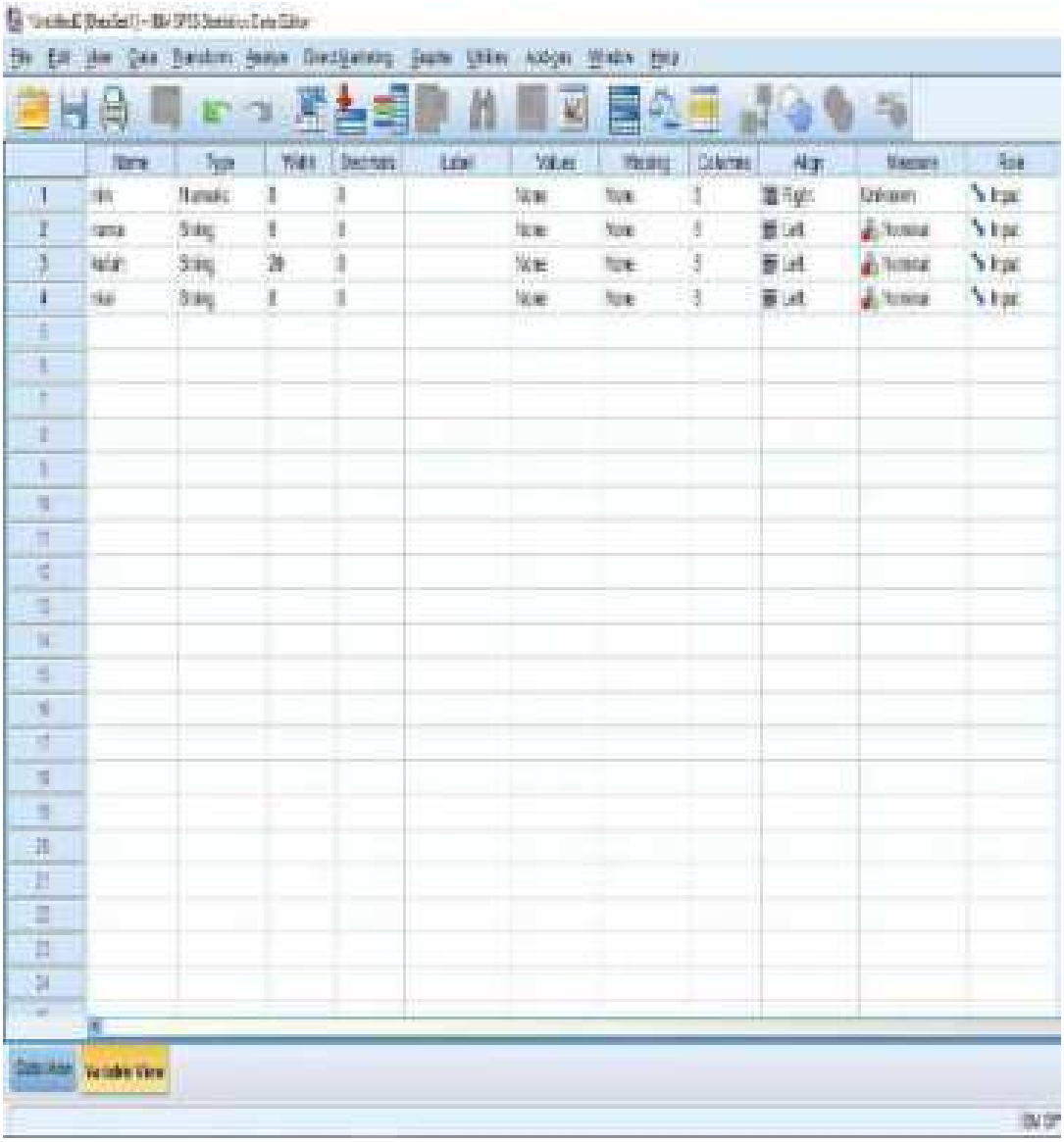
4. Entering the data

Entering data can be done in 2 ways as follows:

a. Enter the data first then define the variable name. The steps to be taken are:
    1) From the main menu the data can be directly inserted into its cells as it looks like the following picture.



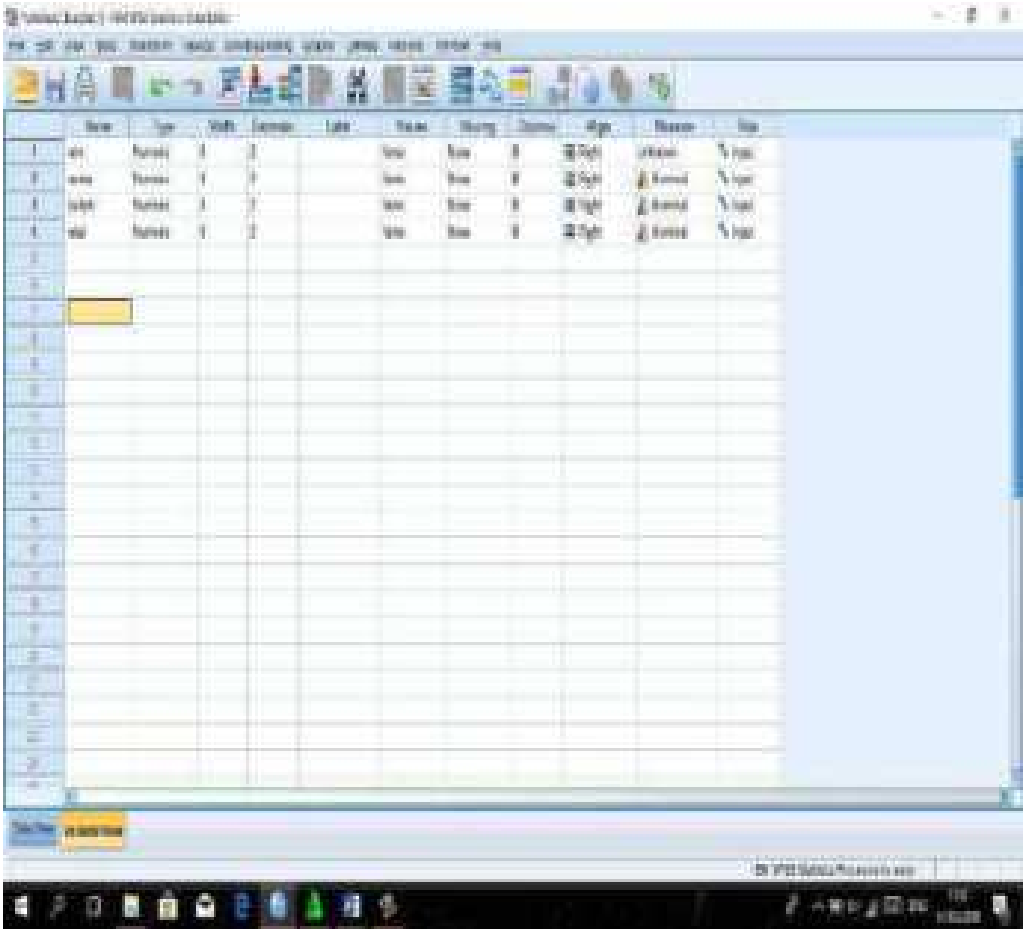
2) Rename the variable with the appropriate name, for example the order of the variable names is NIM, NAME, SUBJECT (KULIAH), and SCORE. The step is click the **variable view** so the following picture appears. Change the default variable SPSS with the appropriate variable name.



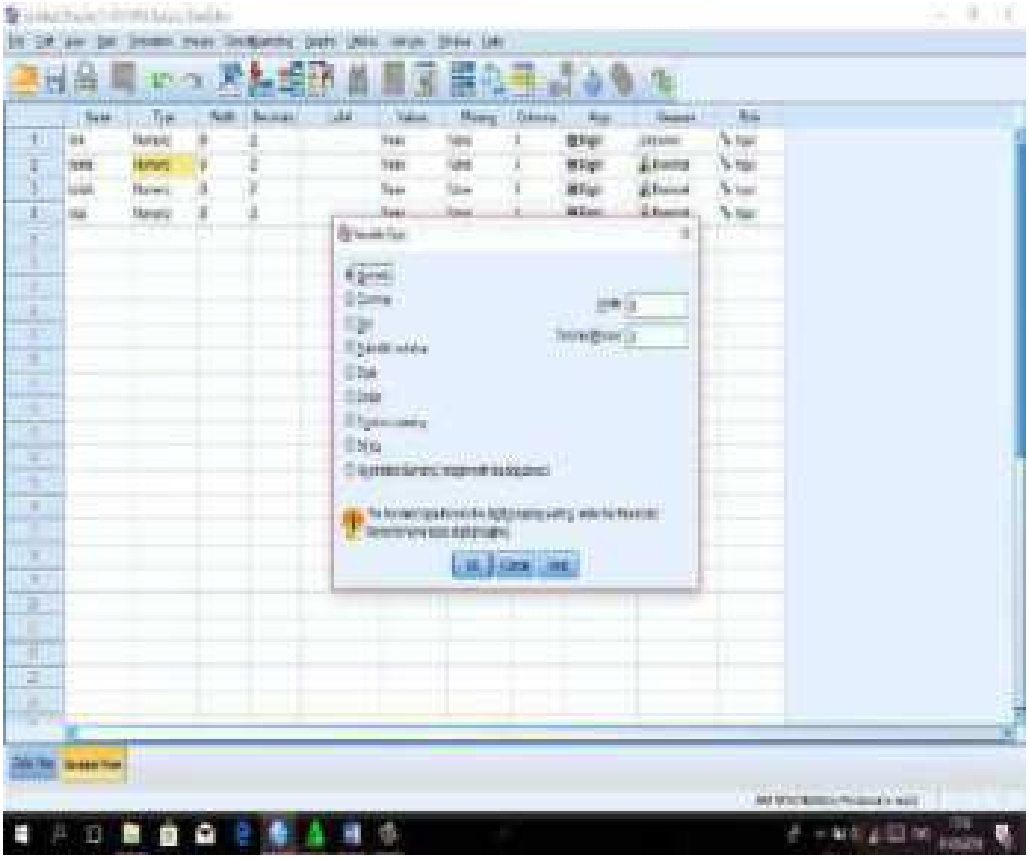
3) If you want to see the effect of variable replacement, click the data view so that the display looks like the following picture:

b. Defines the variable first and then inserts the data. The steps that must be done is as follows (previously select the file menu, then new, data):

   1) Enable the variable view (in the lower left corner).
   2) Fill in the name of the variable in the name field as shown in the display in the image below:

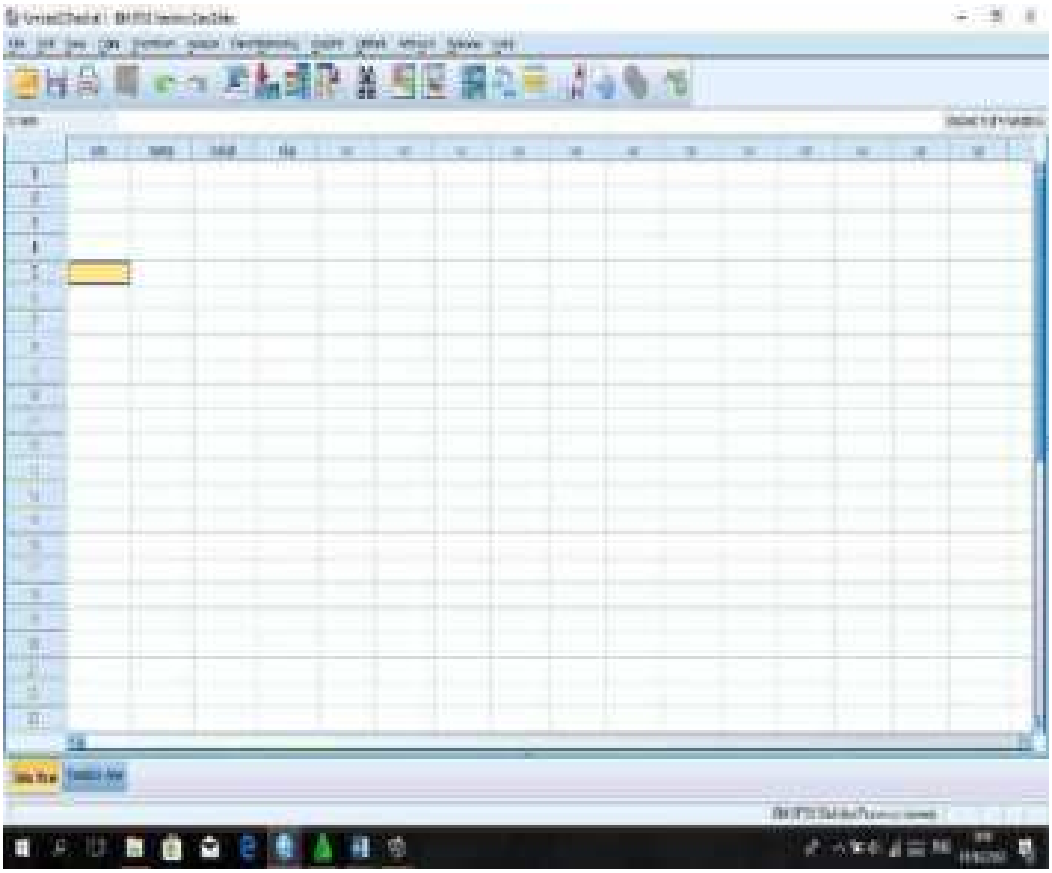


3) Arrange the type of the column as needed by clicking on the existing cell variable name, choose the appropriate data type (see picture below).



4) Click OK button to continue, or cancel if you want to cancel it.

5) After the definition is done then the entry is done then the data can be filled with the first activation data view.



5. STORING DATA

Saving documents or storing data is recording all documents to disk or hard drive. The data in SPSS has a sav extension (.sav). While the output of the data processing conducted by SPSS extension spo (.spo). The steps to save are as follows:

a. Storing data

1) If the data file has not been opened, then open the first data file to be saved.

2) Then choose file menu → save as (if not already saved) or save (if it has ever saved), so the following picture appears:

3) Choose where to save the data by clicking on the save in option box.
4) If you can place, in the file name field, fill in the name of the data file with the extension. Sav.
5) When the name is correct, then press save button.

b. Saving output (result)

1) If the output file has not been opened, then open the first output file to be saved.
2) Then select file menu, save as (if never saved) or save (if it has been saved).
3) Select a place to save the output by clicking on the save in option box.

4) If you can place, in the file name field, fill in the file name of the data with the extension .spo.

5) When the name is correct, then press save button.

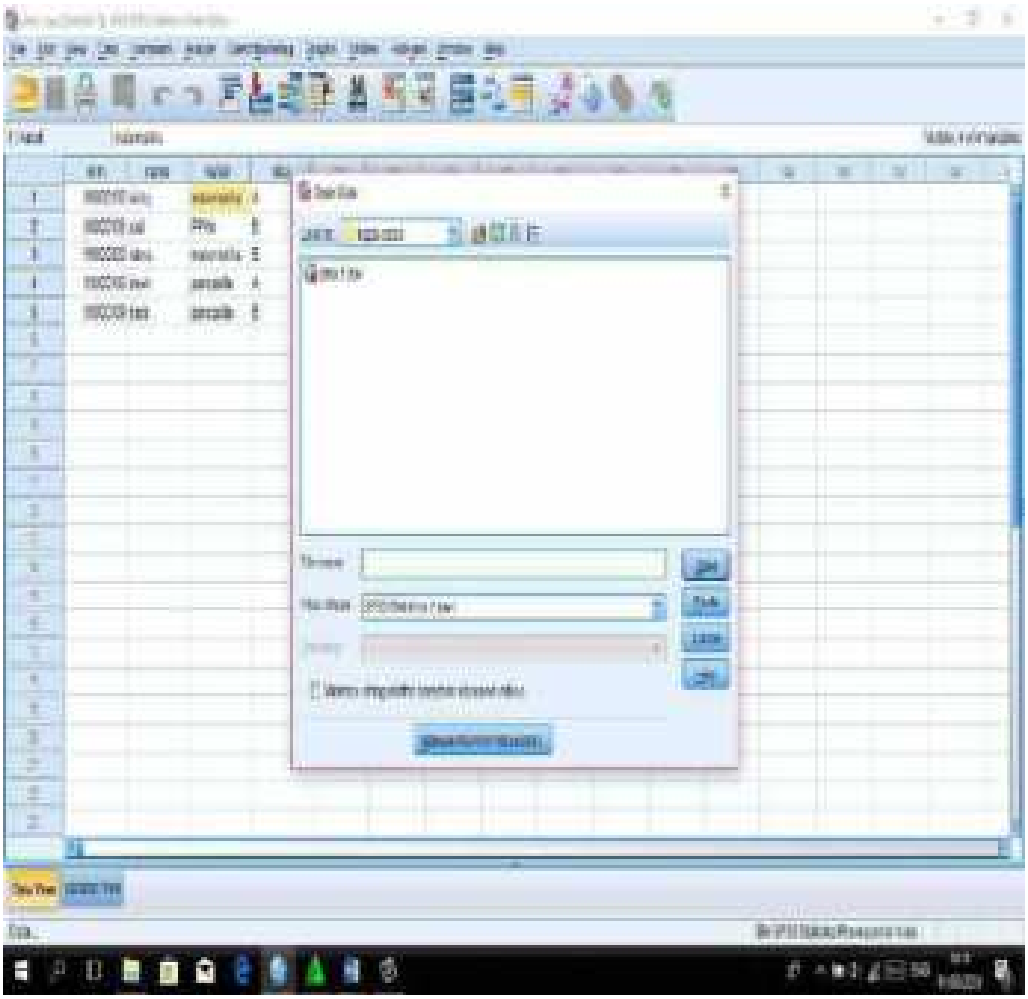
6. OPENING DATA / OUTPUT

Opening or data processing (output), means to reopen a document that has been saved. This is done to make improvements or to analyze the results of data processing.

a. open the data

Steps to call / open data data are:

1) Tap the open icon or select the file menu → open → data, then it appears



2) Specify the folder (file) to be opened in the **Look in** icon.

3) Click the name of the file you want to open, then click the open button on the right of the File Name icon.

b. Open output results. Steps to open output results are:

1) Select **File** menu →**open** → **output**, then the following layer appears

2) Set up the folder (file) to be opened in the **Look in** icon.

3) Click the name of the file to be opened, then click the open button on the right of the File Name icon.

7. End the SPSS

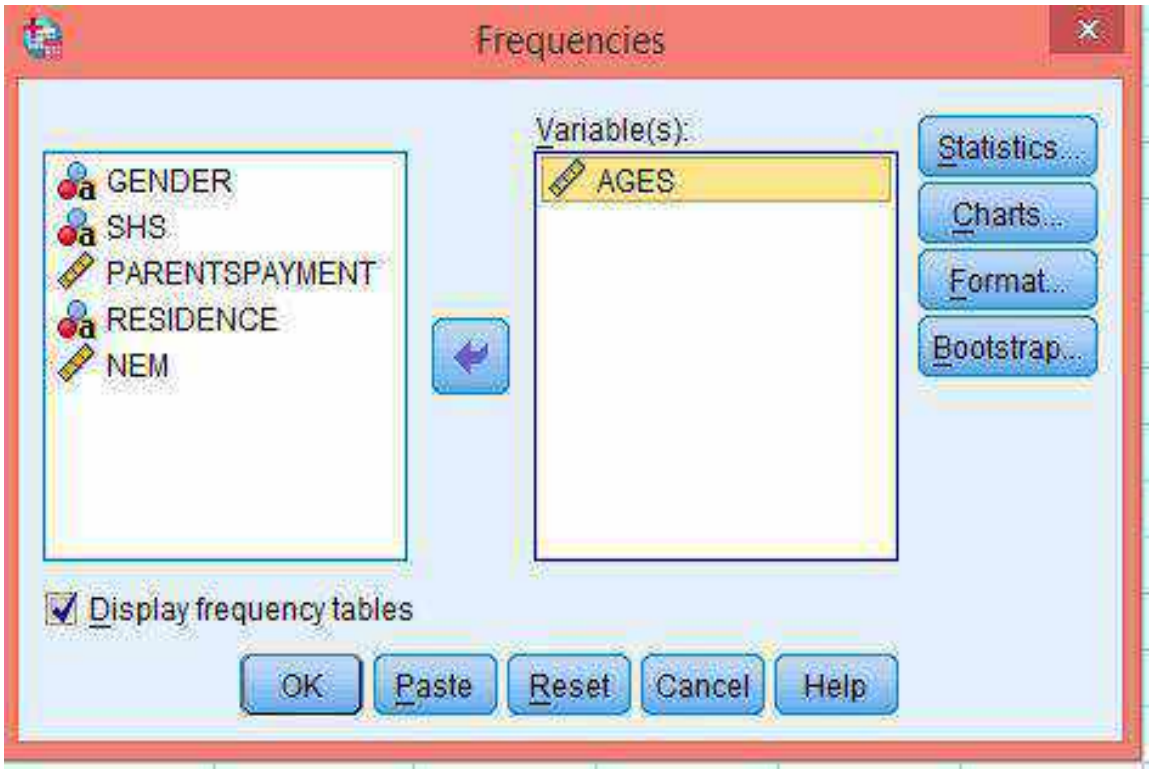
As the other software, to end the work of a software is done by activating the File menu, then click **EXIT**. Another way is done by pressing the image **X** (cross) which is on the right top right **Title Bar**.

3. PRACTICUM OF DESCRIPTIVE DATA WITH SPSS

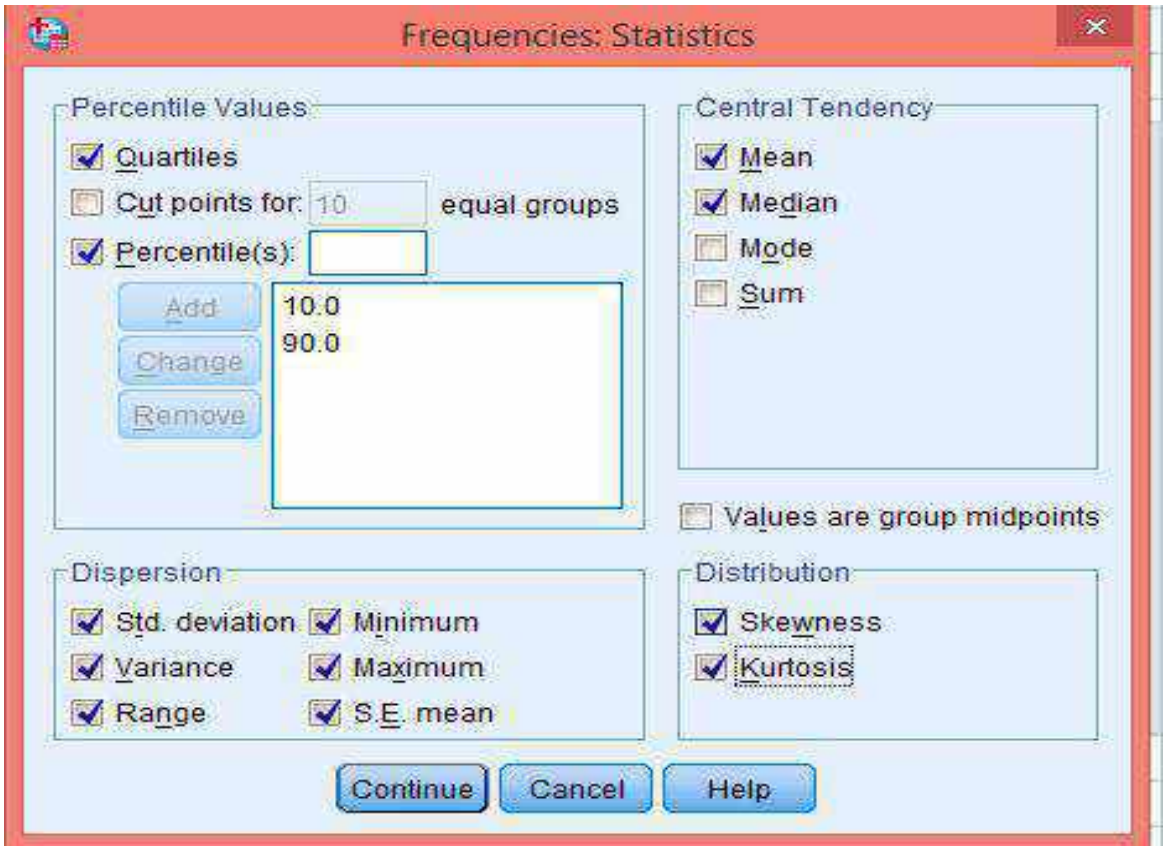
1. FREQUENCIES

Frequency is about data in various size such as mean, median, percentile, and others (Franzese & Iuliano, 2018; Horton & Switzer, 2005; Vanlalhriati & Singh, 2015; Wilmot & Mansell, 2014). We will make table frequency and create descriptive data on the variable of the students' age. We must follow this steps :

1. Open/activate file 'New Student' (mahasiswa baru) from Practicum 1
2. From the main menu of SPSS, choose menu **analyze** ⇒ **Descriptive Statistic** ⇒ **Frequency** that are from main menu. It shows as the followings :



3. In variable box. fill the variable of students' age by clicking age variable in the left box and click (▸) to move it to the right box
4. Click statistic to create descriptive data, until the following picture appears :



Fill statistic box according to needs of descriptive data that will be showed. To create uniformity, do the steps like the picture above. When we click Percentile(s), we must fill number **10** on the right box, then click the icon **add** until number **10** move to the bigger box. Do the same thing on number **90**.

5. And then click **CONTINUE**
6. After the data entry is finished. Click **OK**

Statistics

AGES

N	Valid	30
	Missing	0
Mean		22.0000
Std. Error of Mean		.39538
Median		22.0000
Std. Deviation		2.16556
Variance		4.690
Skewness		1.222
Std. Error of Skewness		.427
Kurtosis		2.341
Std. Error of Kurtosis		.833
Range		10.00
Minimum		19.00
Maximum		29.00
Percentiles	10	20.0000
	25	20.0000
	50	22.0000
	75	23.0000
	90	25.0000

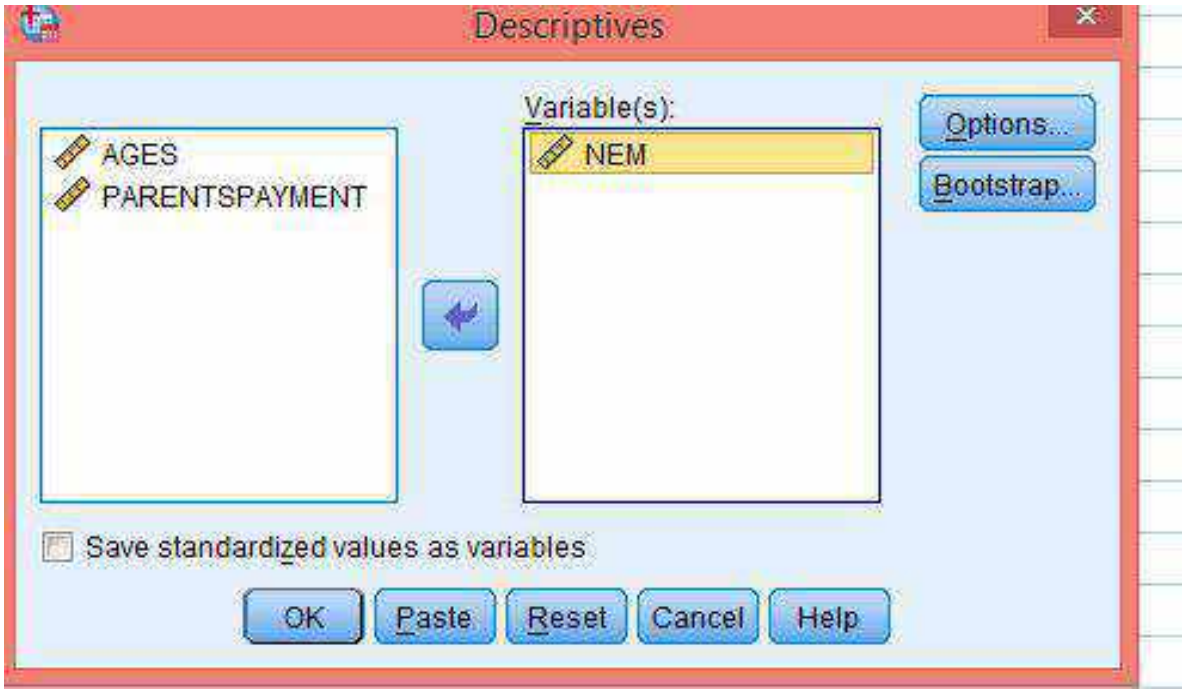
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	19.00	2	6.7	6.7	6.7
	20.00	6	20.0	20.0	26.7
	21.00	6	20.0	20.0	46.7
	22.00	6	20.0	20.0	66.7
	23.00	4	13.3	13.3	80.0
	24.00	2	6.7	6.7	86.7
	25.00	3	10.0	10.0	96.7
	29.00	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

7. Results :
    a. Students whose age is 19 Years Old : 2 people
    b. Students whose age is 20 Years Old : 7 people
    c. Etc.

2. DESCRIPTIVE DATA

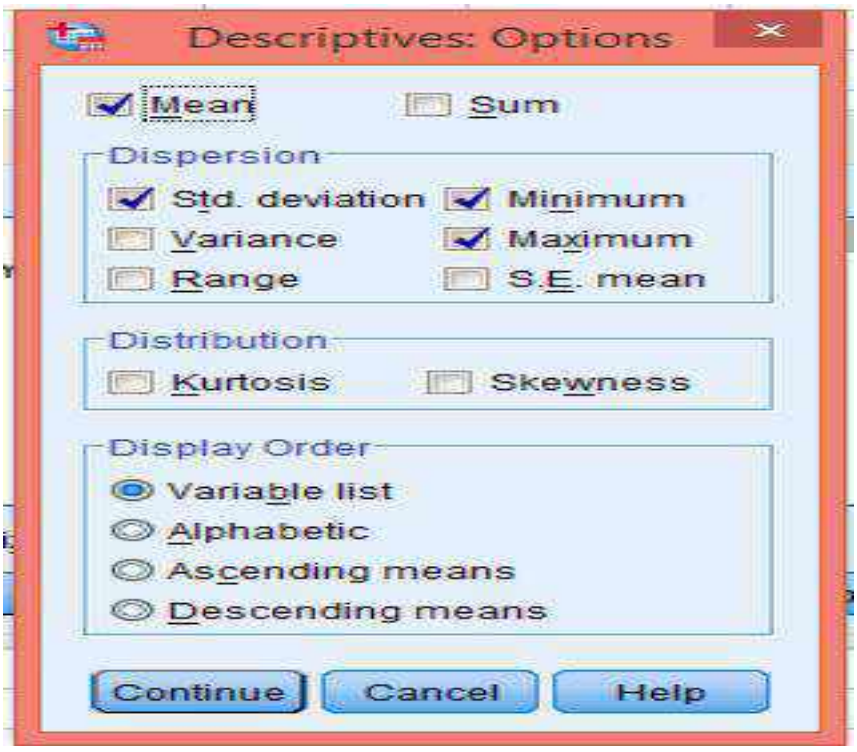
Descriptive data is used to create some data such as mean, standard deviation, varians and others. For example we will describe the variable of *NEM* (High School Score) on student data. We must follow the following steps :

1. Open/activate the file of 'new student' (mahasiswa baru) from practicum 1.
2. From the main menu of SPSS, We must choose **analyze** ⇒ **Descriptive Statistic** ⇒ **Descriptive**, and then the following picture will appear :



3. In variable box, fill *NEM* Variable by clicking variable *NEM* that's in the left box and click (▶) to move variable *NEM* to the right box

4. Click option to make descriptive data, until the following picture appears.



The entry on the **option** box depends on the descriptive data that is presented. For uniformity, choose the options : mean, Std deviation, Minimum, Maximum.

5. Click **CONTINUE** and **OK** if it is already finished.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NEM	30	40.90	70.40	60.4500	6.88631
Valid N (listwise)	30				

6. **Result :**

   a. The number of students (N) that are analized : 30 People

   b. *NEM SLTA* minimum : 40.90

   c. *NEM SLTA* Maximum 70.40

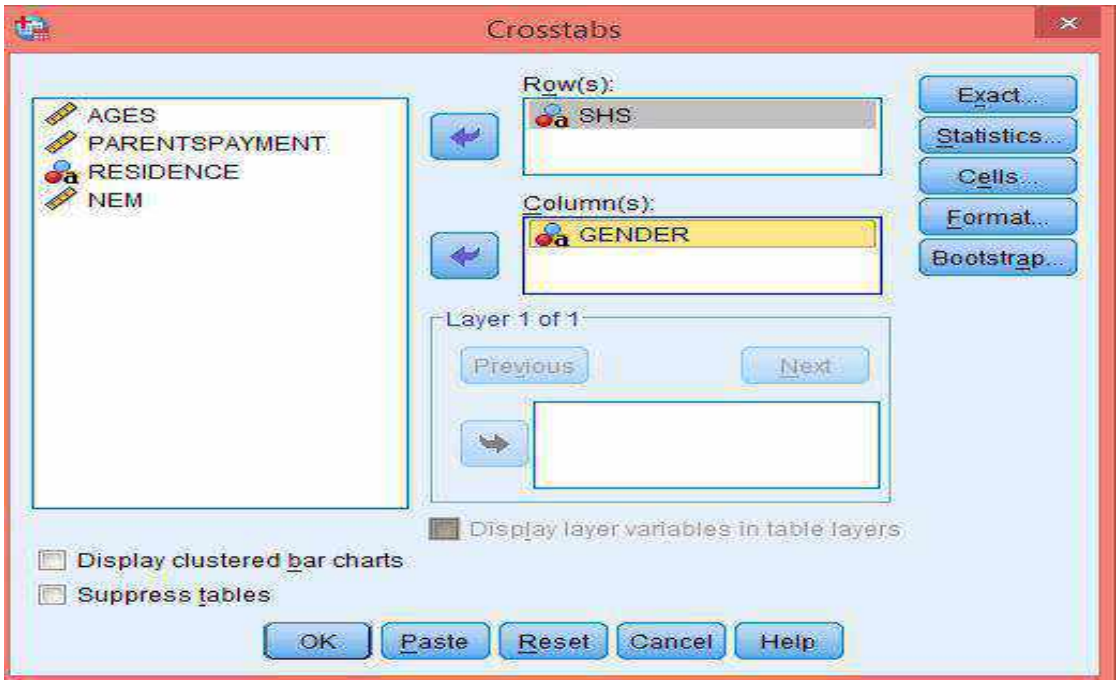
   d. Mean of *NEM* : 60.4500

   e. Standard deviasi 6.88631

3. CROSSTAB

Crosstab shows data that is is tabulation consisting of rows and column. For example you will make crosstab between gender variable by using the data of education from students. We must follow the following steps :

1. Open the file of 'new student'.
2. From the main menu of SPSS, choose menu **analyze** ⇒ **Descriptive Statistic** ⇒ **Crosstab**, until the following picture appears:



3. In the ROW(s), fill in with **Recent Graduate** variable.
4. In the box of **Column**(s), fill variable **Gender**
5. Click **OK** to end the entry and the result will be like the following picture:

SHS * GENDER Crosstabulation

Count

		GENDER			Total
		Female	male	Male	
SHS	MA	9	1	5	15
	SMK	4	0	4	8
	SMU	3	1	3	7
Total		16	2	12	30

a. More female students than male students.

b. Male students whose recent graduate at MA: 6 people

c. Female students whose recent graduate at SMK: 4 people

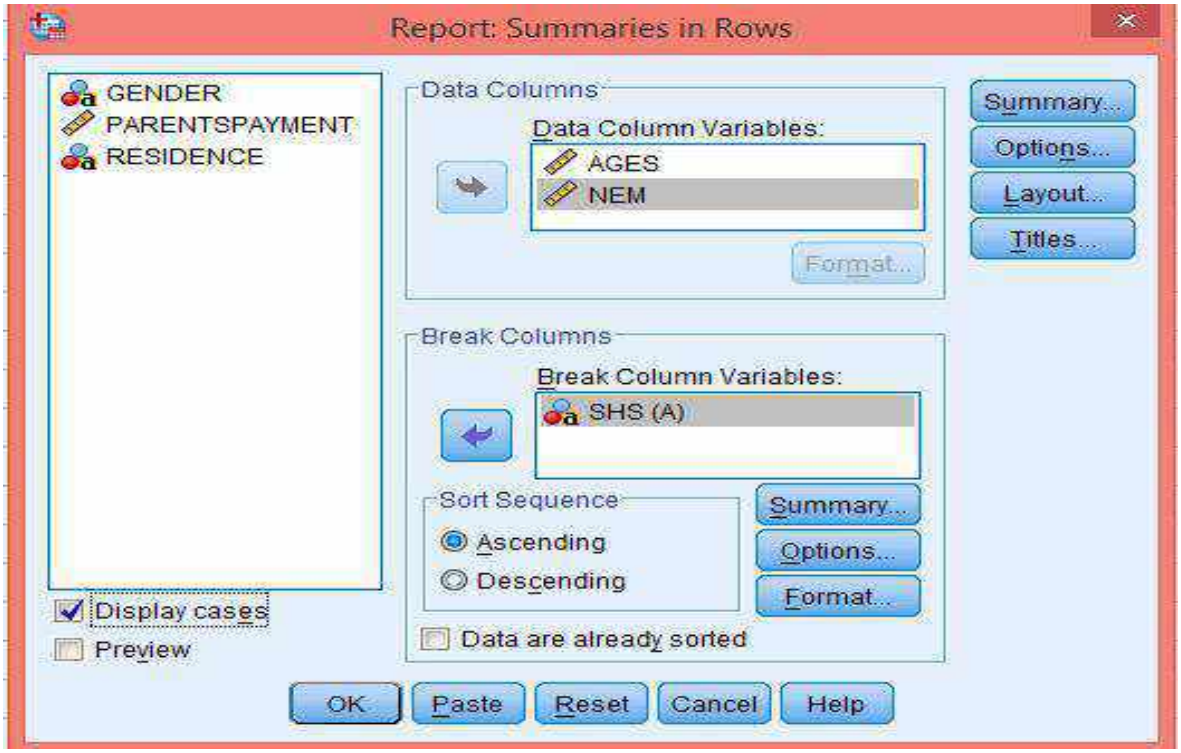
d. ETC.

4. CASE SUMMARIES IN ROWS

Case Summaries shows summary of variables with case view. In **Case Summaries in Rows**, data will be presented according to rows. For example case summaries in rows for the variable of 'age' and *NEM* (high school score) based on the recent graduate on the data of the students. The steps will be as follow:

a. Open/activate the file of 'new student' (mahasiswa baru) from practicum 1.

b. From, the main menu of SPSS, choose menu **analyze ⇒ reports ⇒ reports summaries in rows**, and the following picture will appear:



c. In data Column, fill the variable of age and *NEM*.

d. in Break column, fill variable *recent graduate.*

e. Activate **Display Cases** that's in lower side of dialog box.

f. Click **OK** to end the entry and the result will be like the following.

SHS	AGES	NEM
MA		
	23.00	67.10
	21.00	70.40
	22.00	66.40
	19.00	63.10
	21.00	57.90
	20.00	58.20
	20.00	57.90
	24.00	65.30
	25.00	48.30
	24.00	52.60
	23.00	49.50
	20.00	61.70
	29.00	53.60
	21.00	57.10
	23.00	61.70
SMK		
	22.00	65.20
	25.00	63.40
	23.00	56.90
	20.00	64.20
	21.00	69.10
	23.00	67.50
	21.00	68.20
	23.00	63.80
SMU		
	19.00	57.80
	20.00	40.90
	22.00	58.20
	21.00	67.10
	25.00	62.30
	20.00	56.70

Page 2

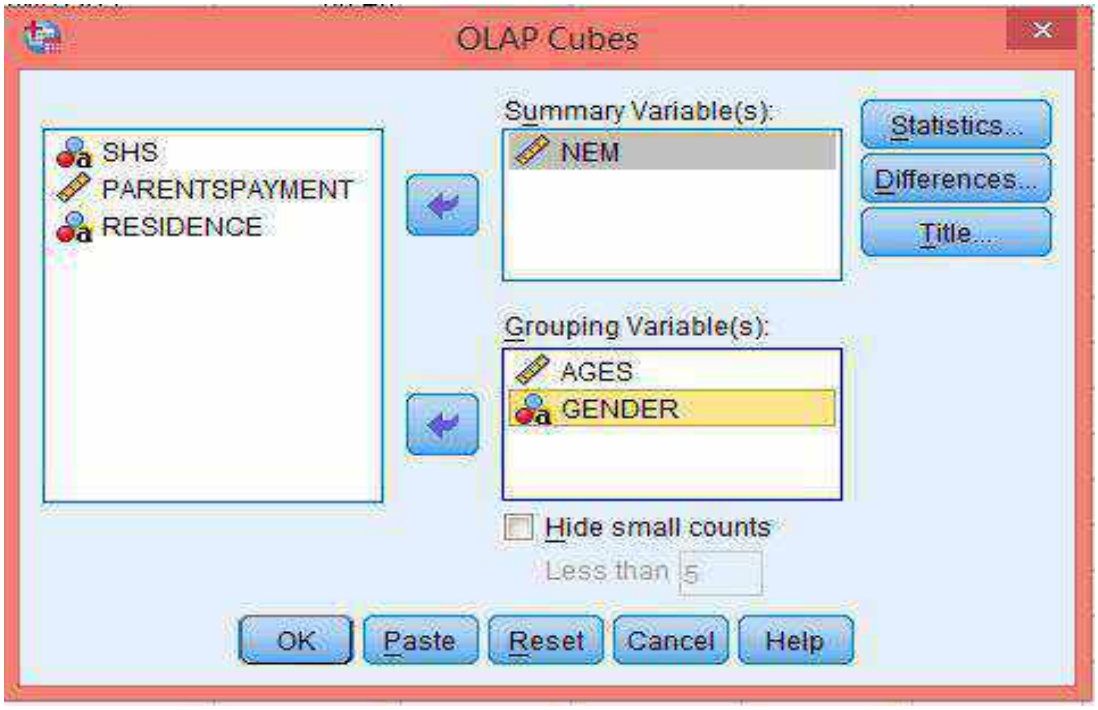
SHS	AGES	NEM
SMU		
	22.00	56.80

5. OLAP CUBES

Olap Cubes is used to summarize data easily and can contain various variables. For example to see ***NEM*** variable from **age** and **gender** variables. The steps are as follow:

a. Open/activate the file of 'new student' (mahasiswa baru) from Practicum 1.

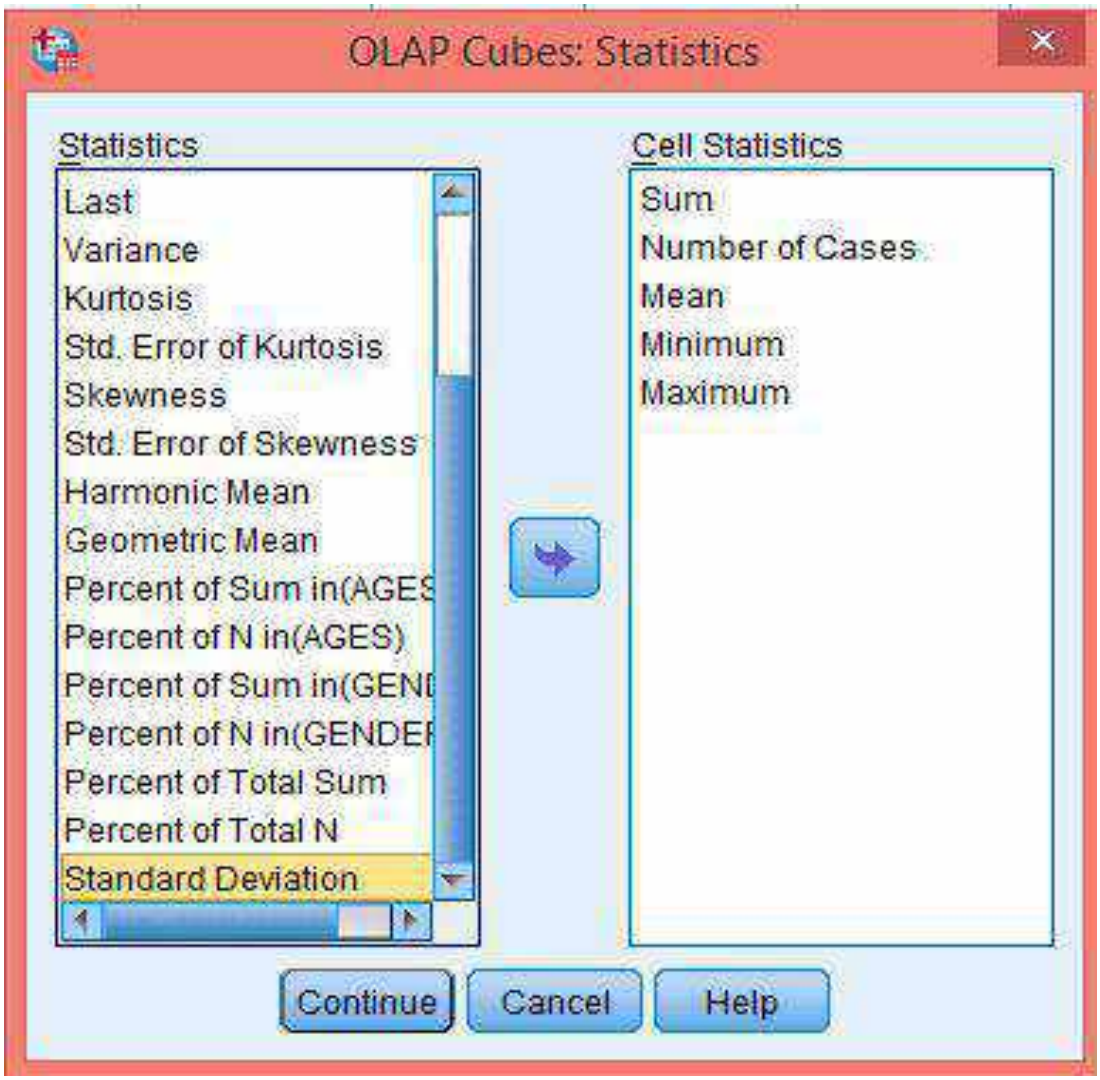
b. From the main menu of SPSS, choose menu **Analyze** ⇒ **Reports** ⇒ **Olap Cubes**, until the following picture appears.



c. fill ***NEM*** variable to Summary Variable(s) box;

d. fill **age** and **gender** variable to Grouping Variable(s) box;

e. click **Statistics** and then choose **Mean**, **Sum**, **Min**, **Max** and end by clicking **Continue**, until the following picture appears:



f. Click **Title** to describe detail that will be showed in the output

1. in the **Title** box, please type ***NEM*** according to **Age** and **Gender**

2. in the **Caption** box, type student data .

g. If the entry is finished, click **Continue** ⇒ **OK**

h. To see the function of **Olab Cubes**, drag the pointer to student's **age** or **gender** from the output result. Then, click two times next to Total until the following picture appears. If the menu option appears in Age and Gender variable, so it can be presented in some input such as the following pictures.

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
NEM * AGES * GENDER	30	100.0%	0	0.0%	30	100.0%

OLAP Cubes

AGES: 21.00

GENDER: Male

	Sum	Mean	N	Minimum	Maximum
NEM	207.90	69.3000	3	68.20	70.40

4. PRACTICUM OF CHARTS WITH SPSS

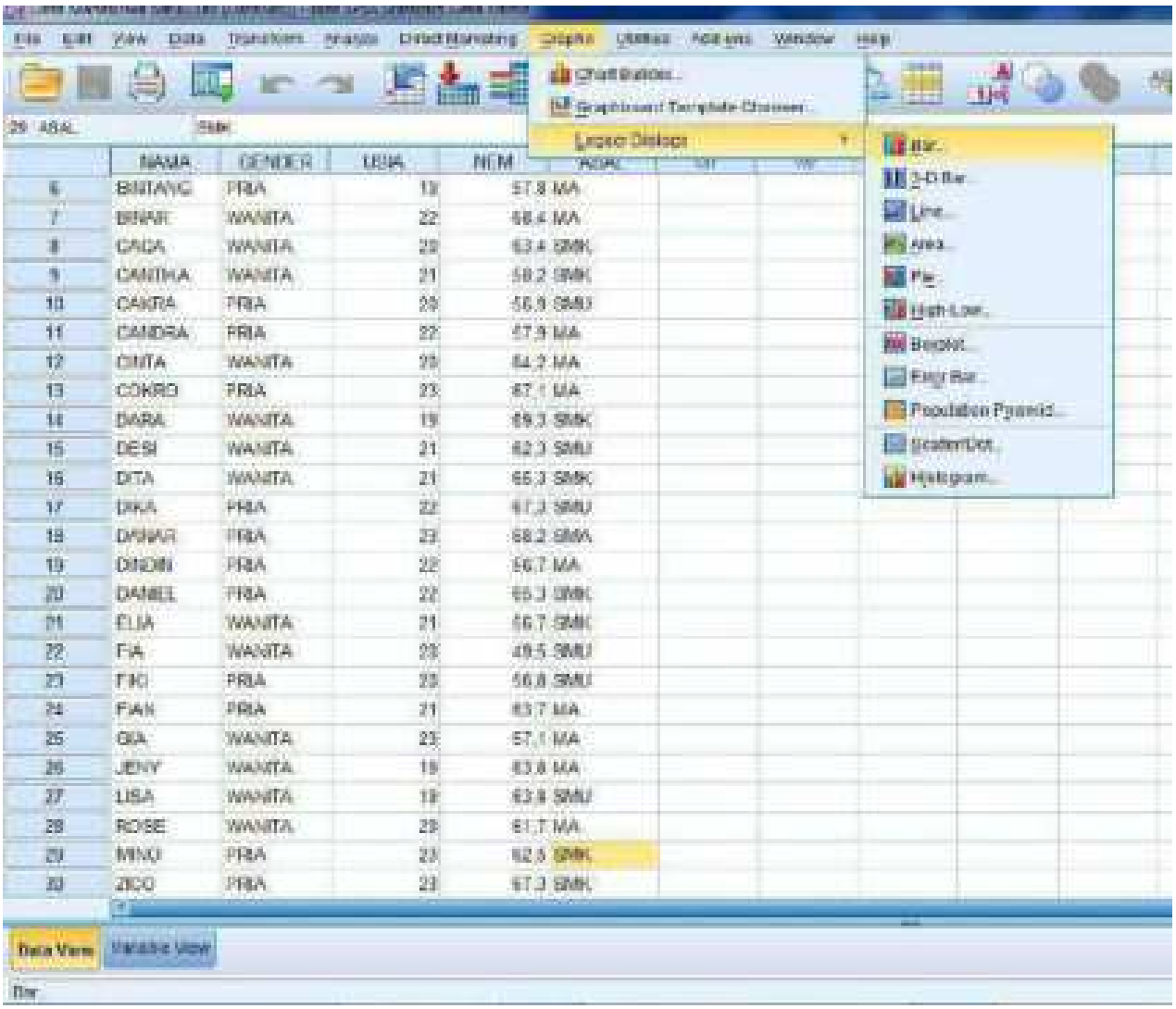
----------SPSS (Statistic Product and Service Solutions)----------

1. BAR CHART

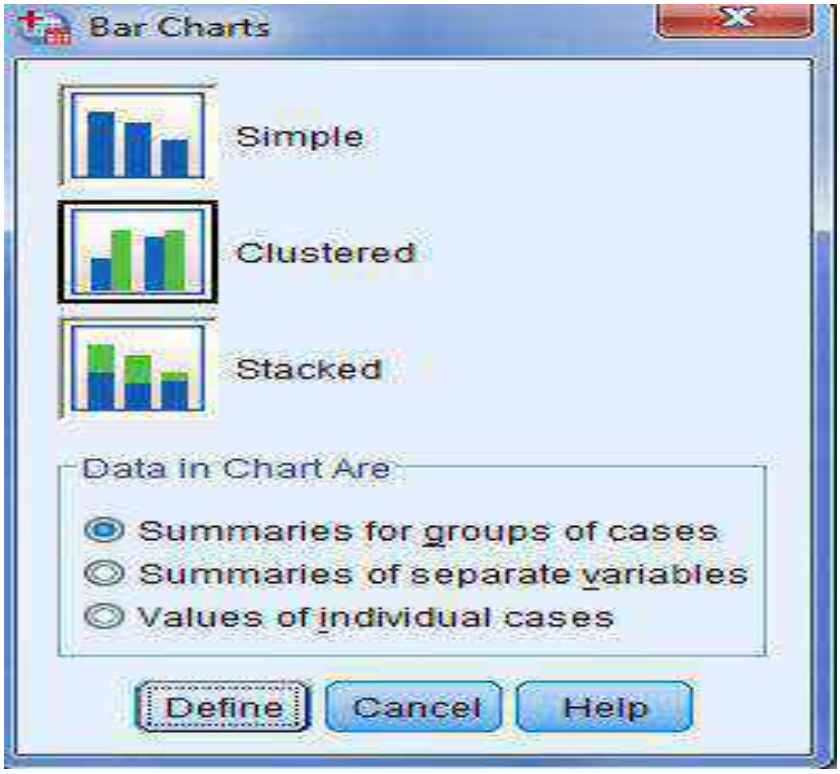
Graphs with bar types (bars) are used to display qualitative data. For example will create a bar graph, which displays the age variable based on gender variables. Means as the X axis is the age variable and as the Y axis is the frequency variable (Field, 2005; Garth, 2008; Singh, Kumar, 2006; Vanlalhriati & Singh, 2015). The steps are:

a. Open file **Data Mahasiswa Baru**

b. click menu **Graphs→Legacy dialogs→Bar**



After doing a step like the above, the result will appear as follows :



On the menu **Bar Chart :** klik **clustered → Summaries for Groups of Cases→Define**. So that the following picture will appear as follows:

c. In the display

of **Define Clustered Bar** :

i. **choose % of cases.**

ii. Click variable **AGE** and drag to the **Category Axis**.

iii. Click variable **GENDER** dan drag ke **Define Cluster by.**

d. Click menu **Titles**,so the display will be appear as follows:

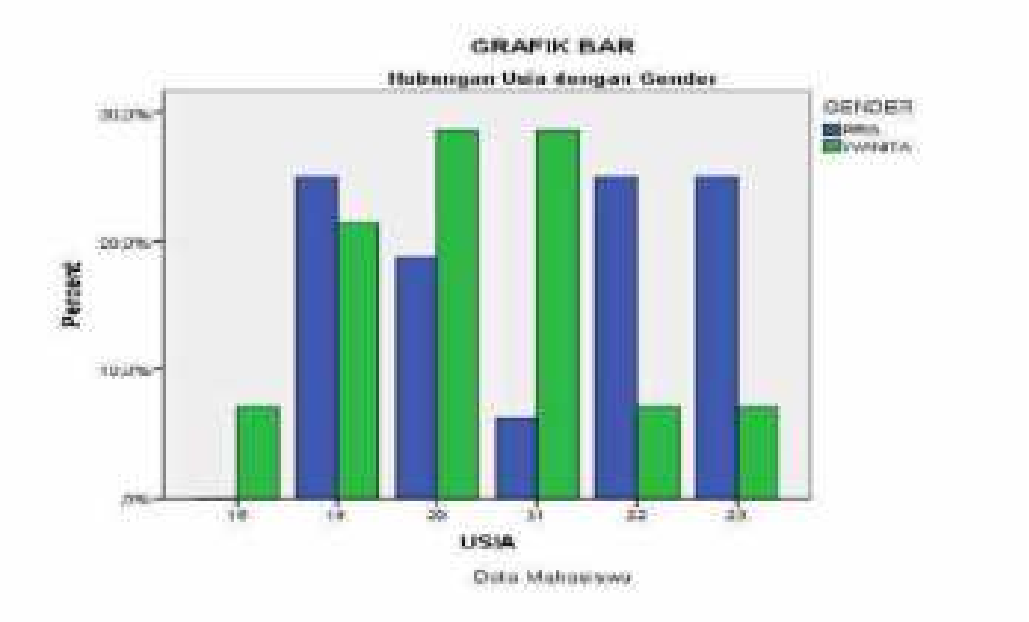
i. On the **chart Title. Line 1**, type : GRAFIK BAR

ii. Then on the **chart Subtitle,** type : Relation AGE and Gender.

iii. On the **chart Footnote. Line 1**, type : DATA MAHASISWA

iv. Click menu **Continue**

e. Finally click **OK** if the entry has been complete and the result is as follows :

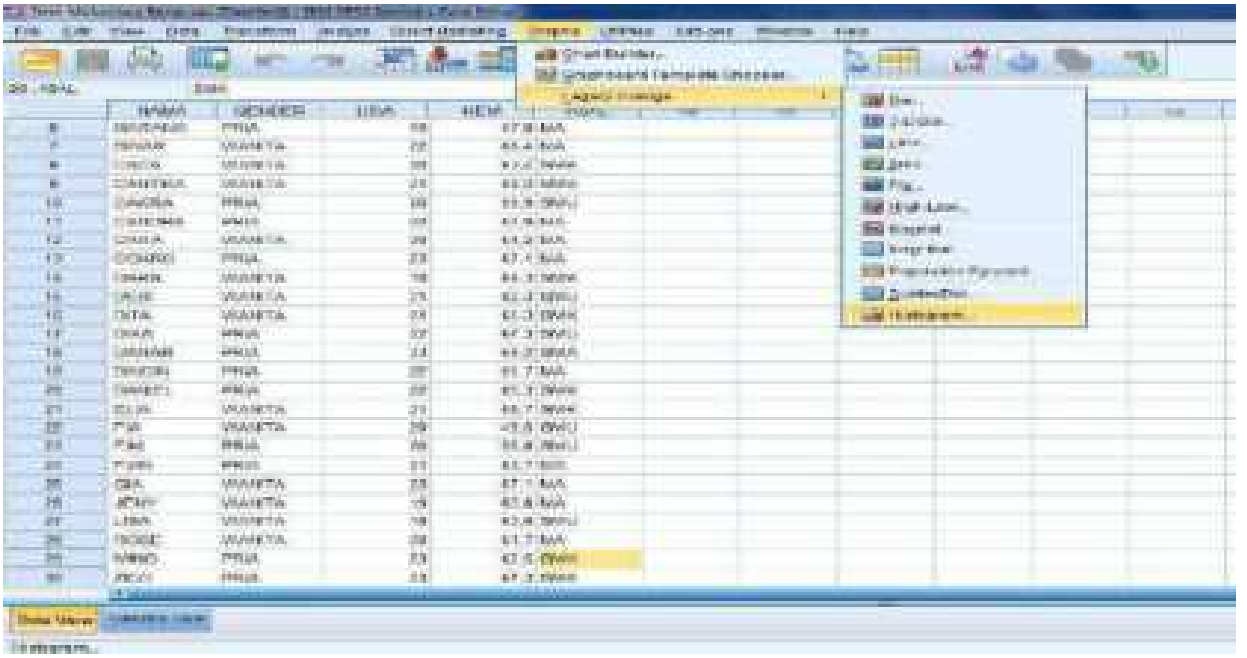


2. HISTOGRAM

A histogram is a Bar type graph that is used to describe a frequency distribution. The histogram is also used to see if the data is normally distributed or not. For example, it will create a Histogram graph for the distribution of the SCORE variable along with its normal curve. The steps are as follows:

a. Open file **Data Mahasiswa Baru**

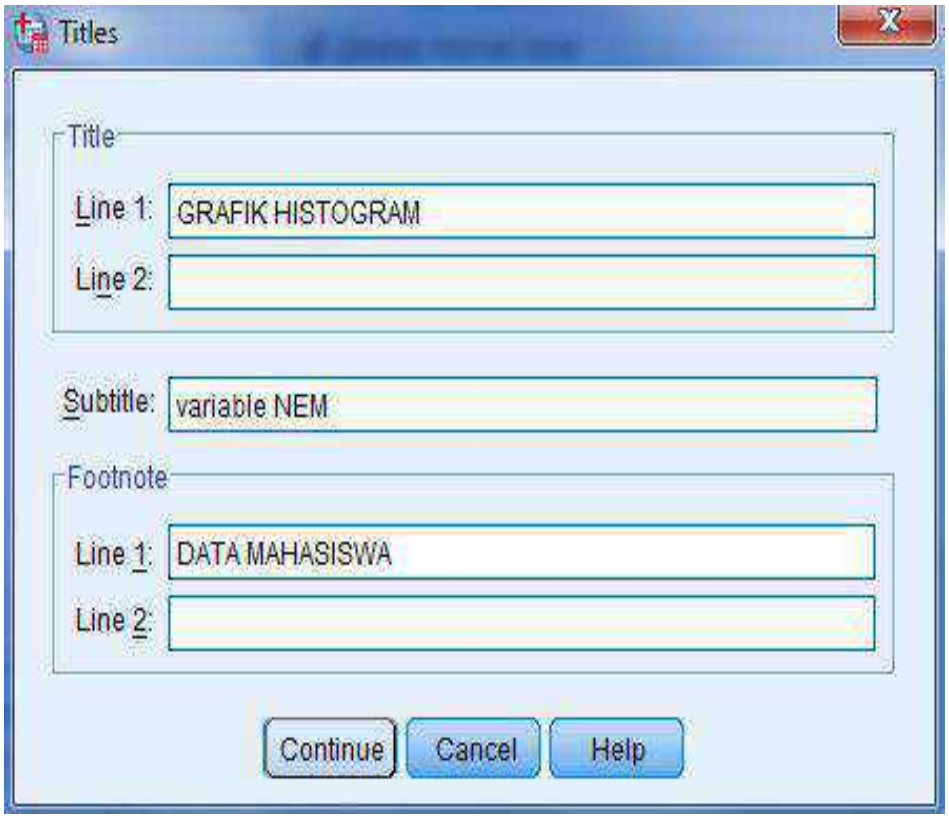
b. Click menu **Graphs→Legacy dialogs→Histogram**



After doing a step like the above, the following picture will appear as follows:

c. On the display of **Histogram** : click **variable SCORE** and drag to the **variable** box.

d. Click menu **Titles**, so the display will be appear as follows:



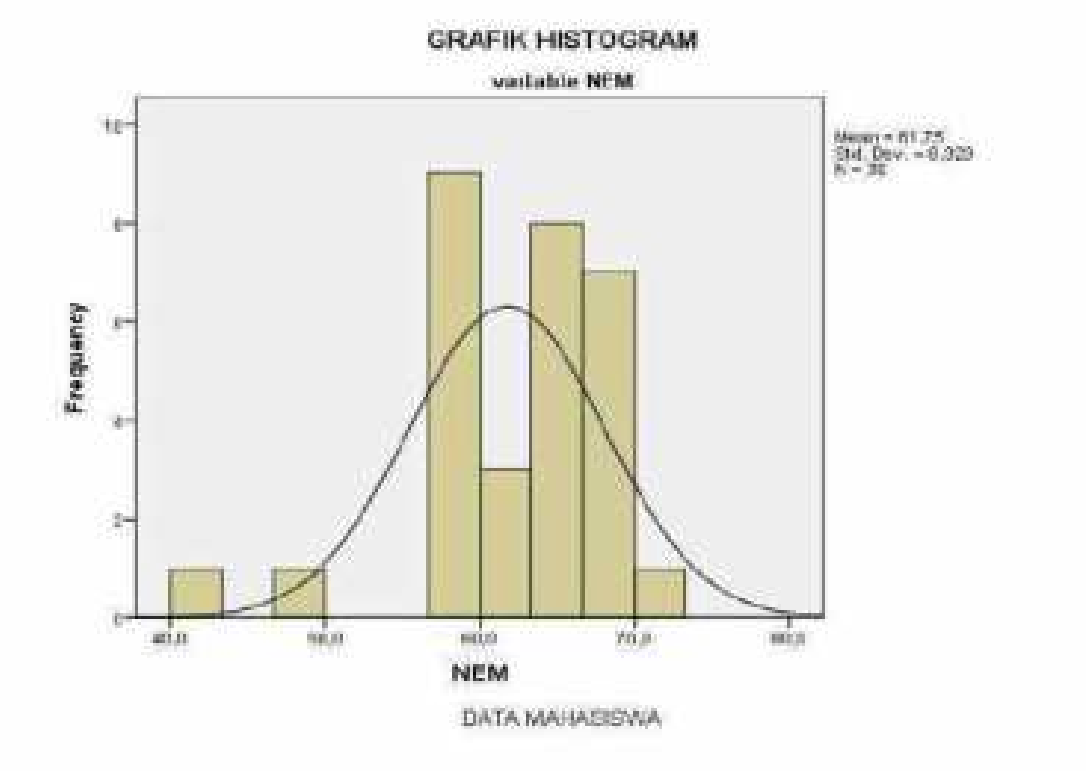
i. On the **chart Title. Line 1**, type : GRAFIK HISTOGRAM

ii. On the **chart Subtitle**, type : SCORE Variable

iii. On the **chart Footnote. Line 1**, type : DATA MAHASISWA

iv. Click menu **continue**

e. Finally click **OK** if the entry has been complete and the result is as follows :

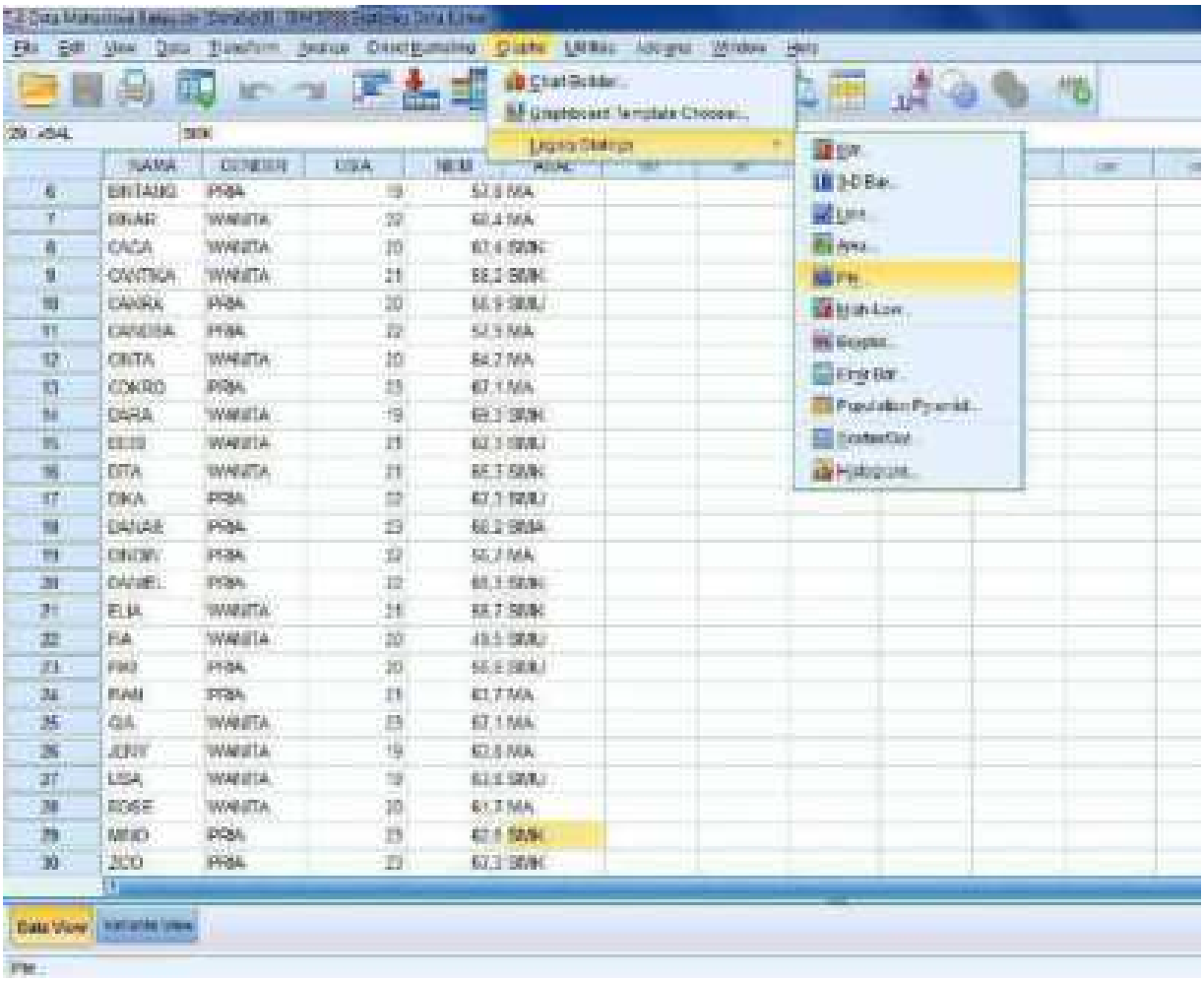


3. PIE CHART

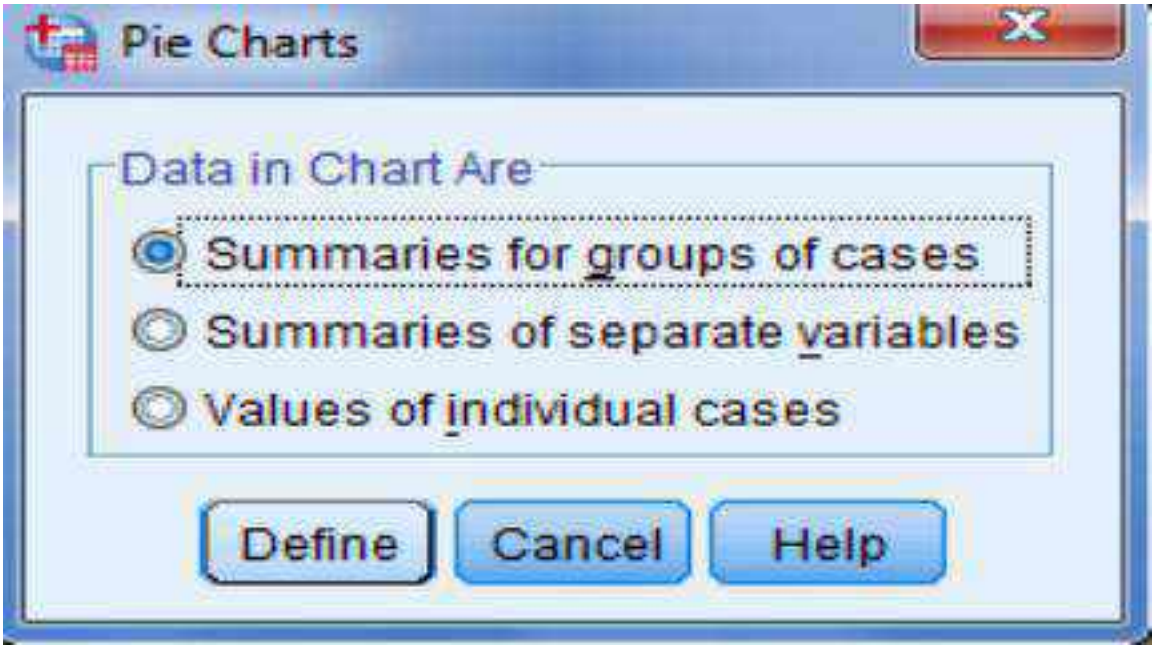
Graphs circle or pie chart is used to show the qualitative data. The composition of pie chart is expressed in percentage. For example, I will make a pie chart to see the composition of age variable. The steps are as follow:

a. Open the data **New Students/data mahasiswa baru**

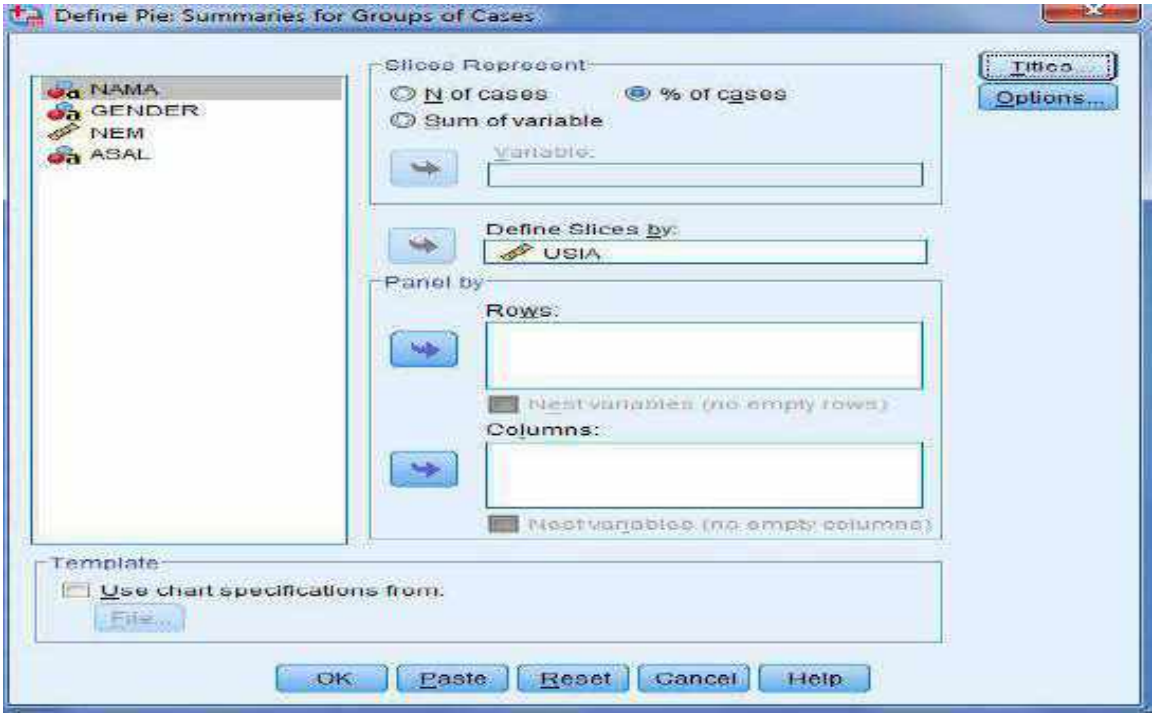
b. Click menu **Graphs →Legacy dialogs →Pie**



After doing the step, the results will appear as follows



c. On the step forward like above, choose **Summaries for group of cases,** and then click **define**. So it will appear like the following picture :

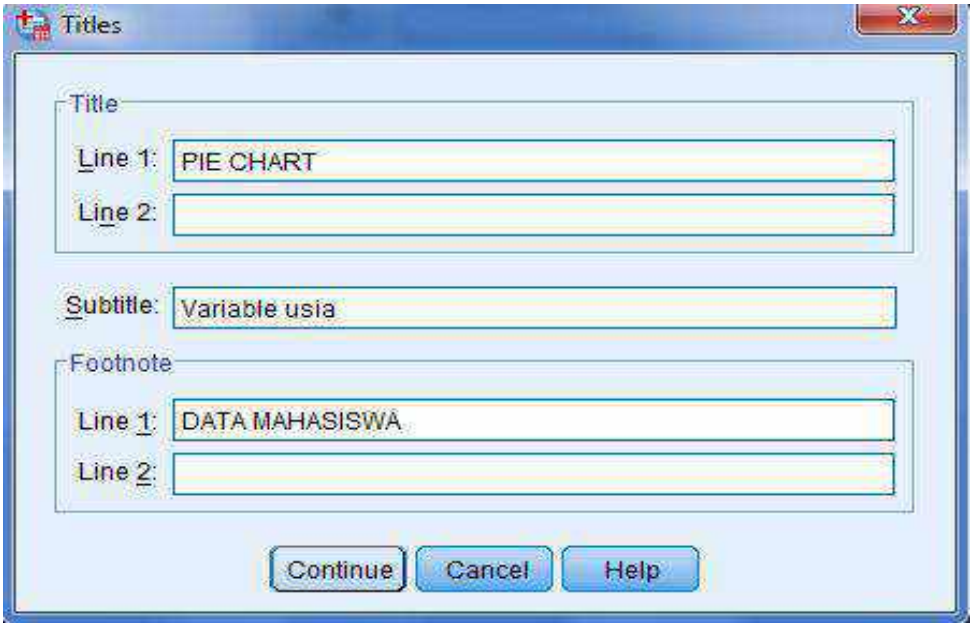


d. On the menu **Define Pie Summaries for Groups of cases** :

i. Click**% of cases**

ii. Click **AGE variable** and drag into **Define slices by**

iii. Click menu **Titles**, until the following picture appears as follows:



e. On the menu **Titles :**

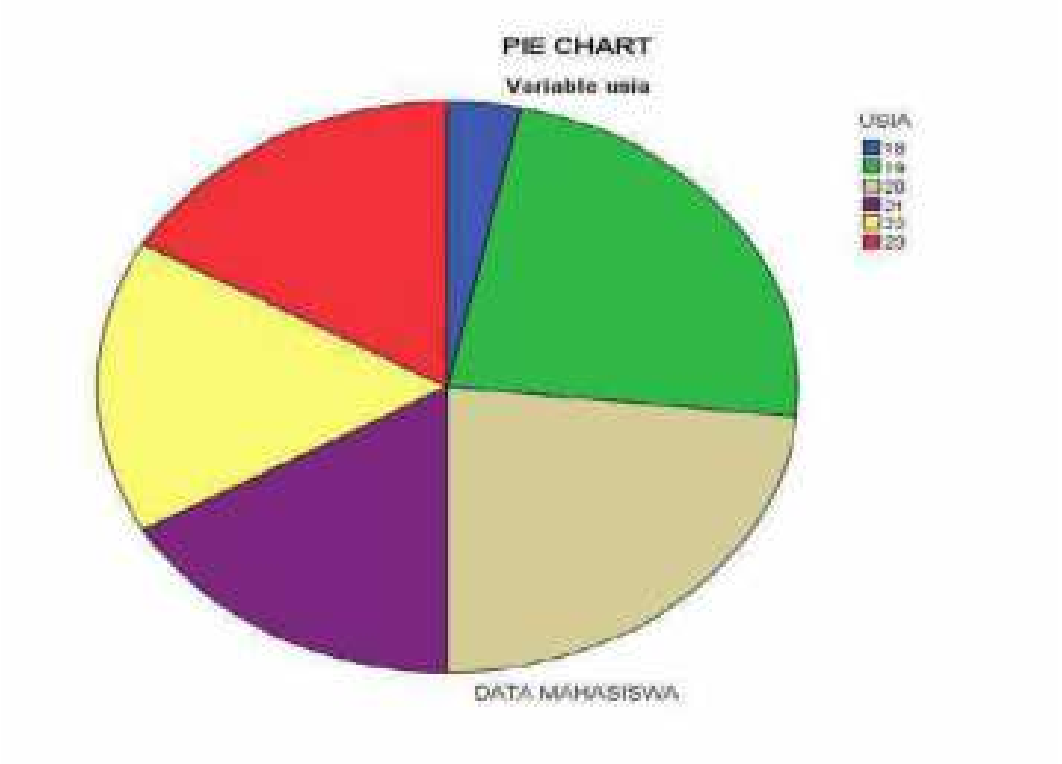
i. On the **Chart Title. Line 1**, type : PIE CHART

ii. On the **Chart Subtitle**, type : Age Variable

iii. On the **Chart Footnote. Line 1**, type : The Data Students

iv. Click menu **Continue**

f. After that, click **OK** if the entry has been complete and the result is as follows :

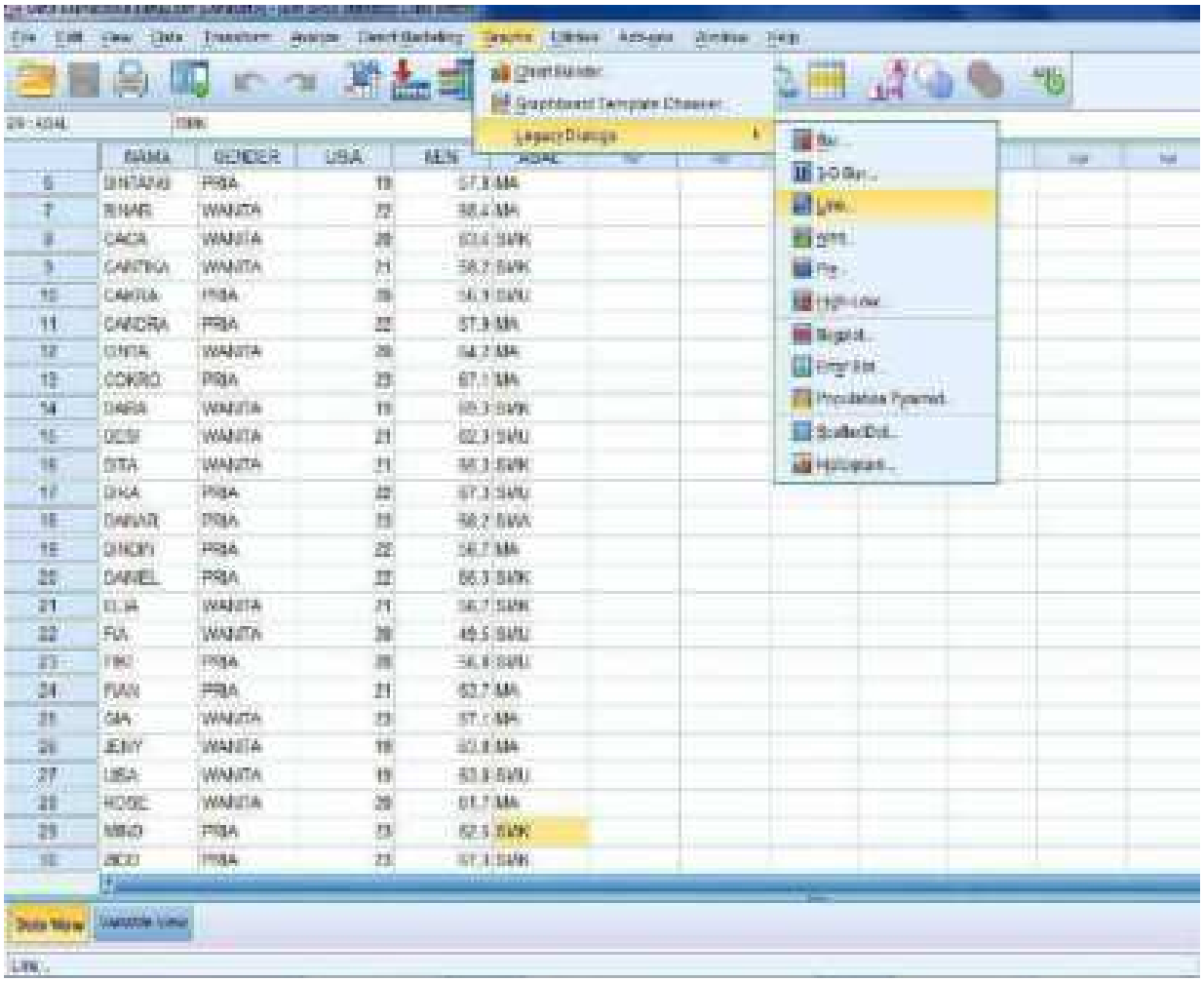


4. LINE CHART

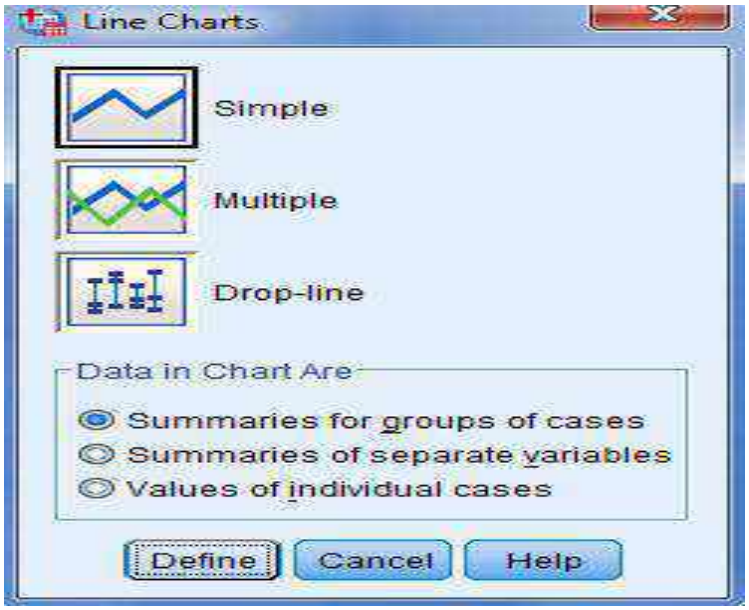
Graphic Line Chart with lines is used to show the qualitative data. For example it is used to make a chart line, namely **SCORE variable.** It means as X axis it is frequency variable and as Y axis is NEM variable. The steps are as follows:

a. Open file **The Data of New Students**

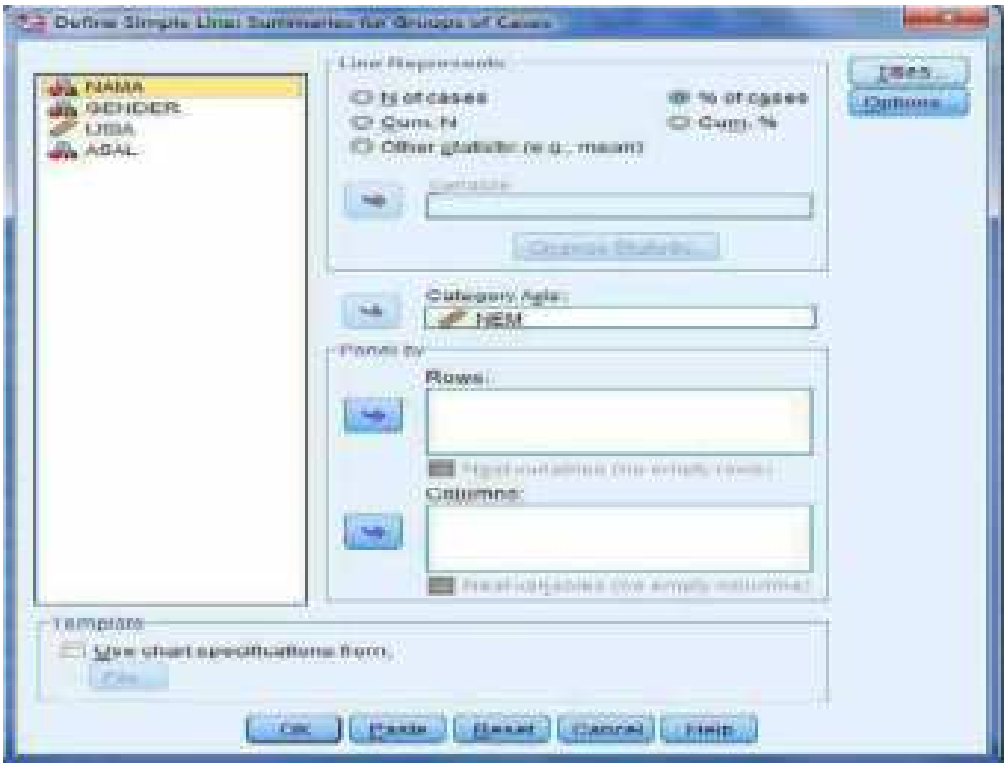
b. Click menu **Graphs →Legacy dialogs →Line**



After the entry has already been done, the following picture will appear:



c. On the menu **Line Chart**: choose the graph **Simple →Summaries for groups of cases→ Define**. Until the following picture appears:



d. On the menu **Define Simple Line**:

i. Click **% of Cases**

ii. Click **SCORE variable** and drag into **Axis category**

iii. Click **Titles** and will appear look as follows :

e. On menu **Titles**:

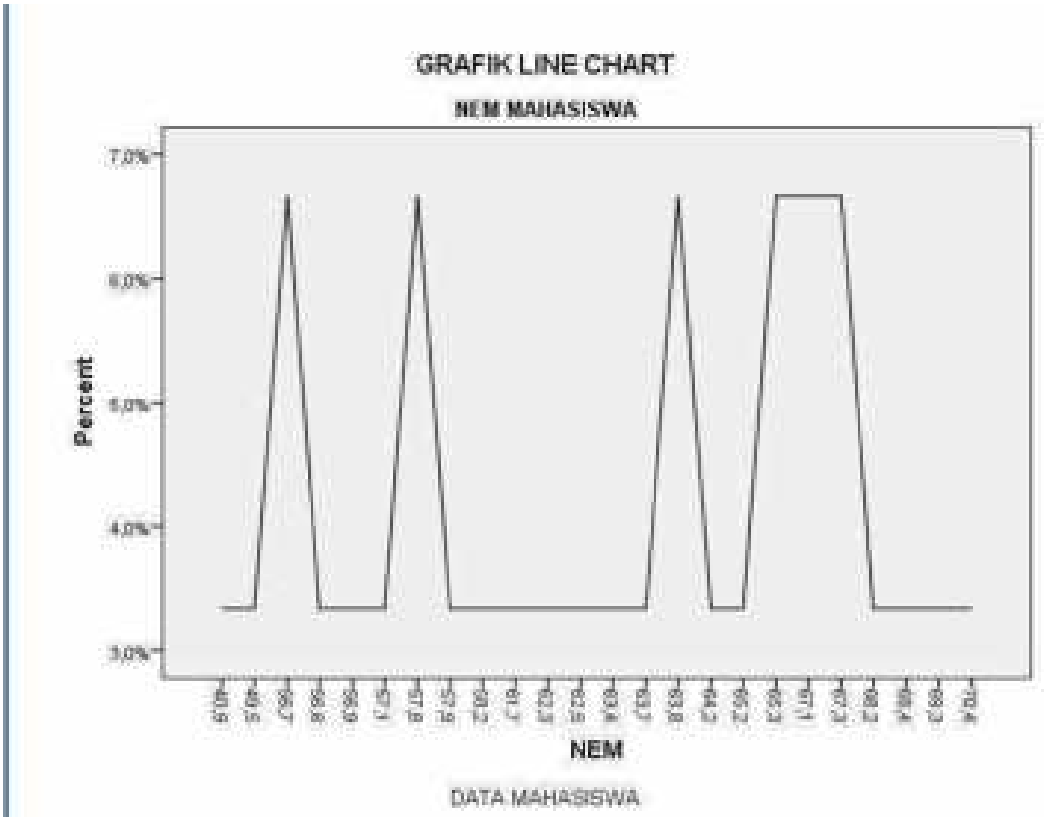
i. On the **Chart Title. Line 1,**type : LINE CHART

ii. On the **Chart Subtitle**, type : SCORE Variable

iii. On the **Chart Footnote. Line 1,**type : The DATA STUDENTS

iv. Click menu **continue**

f. After that click **OK** if the entry has been complete and the result is as follows :



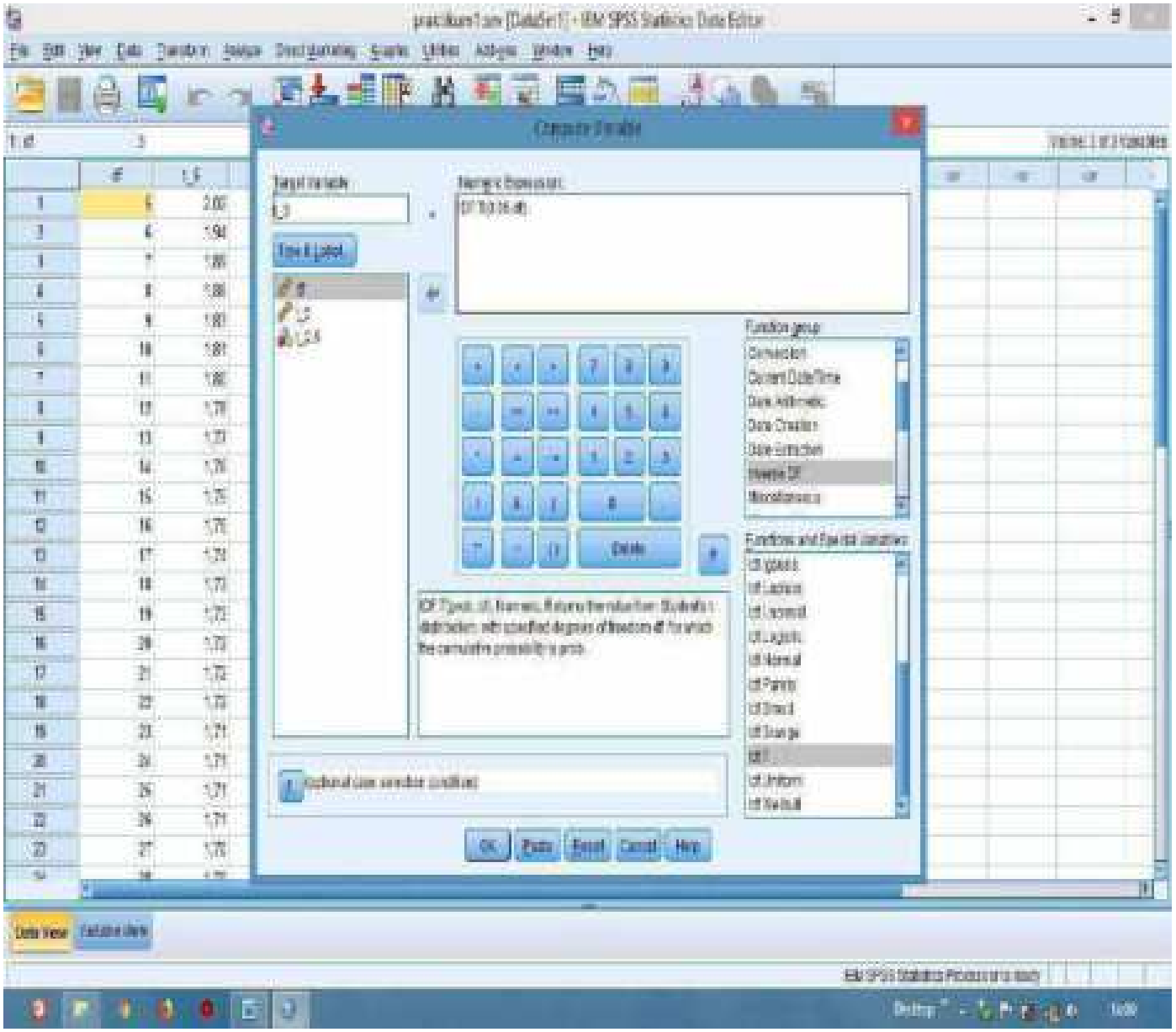
5. PRACTICUM OF CREATING A STATISTIC TABLE WITH SPSS

In testing a hypothesis using t test, F or Chi Square sometimes it requires statistical table (Everitt & Skrondal, 2006; Field, 2005; Jackson, 2009; Rusydi & Fadhli, 2018). SPSS as a statistical software is not equipped with the ability to create statistics tables directly, but it is still possible to create a statistical table through the menu TRANSFORM. in practice this will be practiced how to create 3 table statistics namely t table, F table and Chi Square table.

1. t Table

To create t table , the first is to determine: degrees of freedom (df) and the amount of significance level (α). And the steps are as follows:

a. determine the degree of freedom (df) that is going to be made, eg 5,6,7,8, ... 30. The writing of degrees of freedom (df) in SPSS is sequentially down (column) and name the variable with df.
b. determine the level of significance (α) eg: 95%, so α = (100-95)% = 5%
c. from the SPSS main menu, open the **Transform** menu → **Computer Variable** ... so the **Compute Variable** dialog box appears as follows:

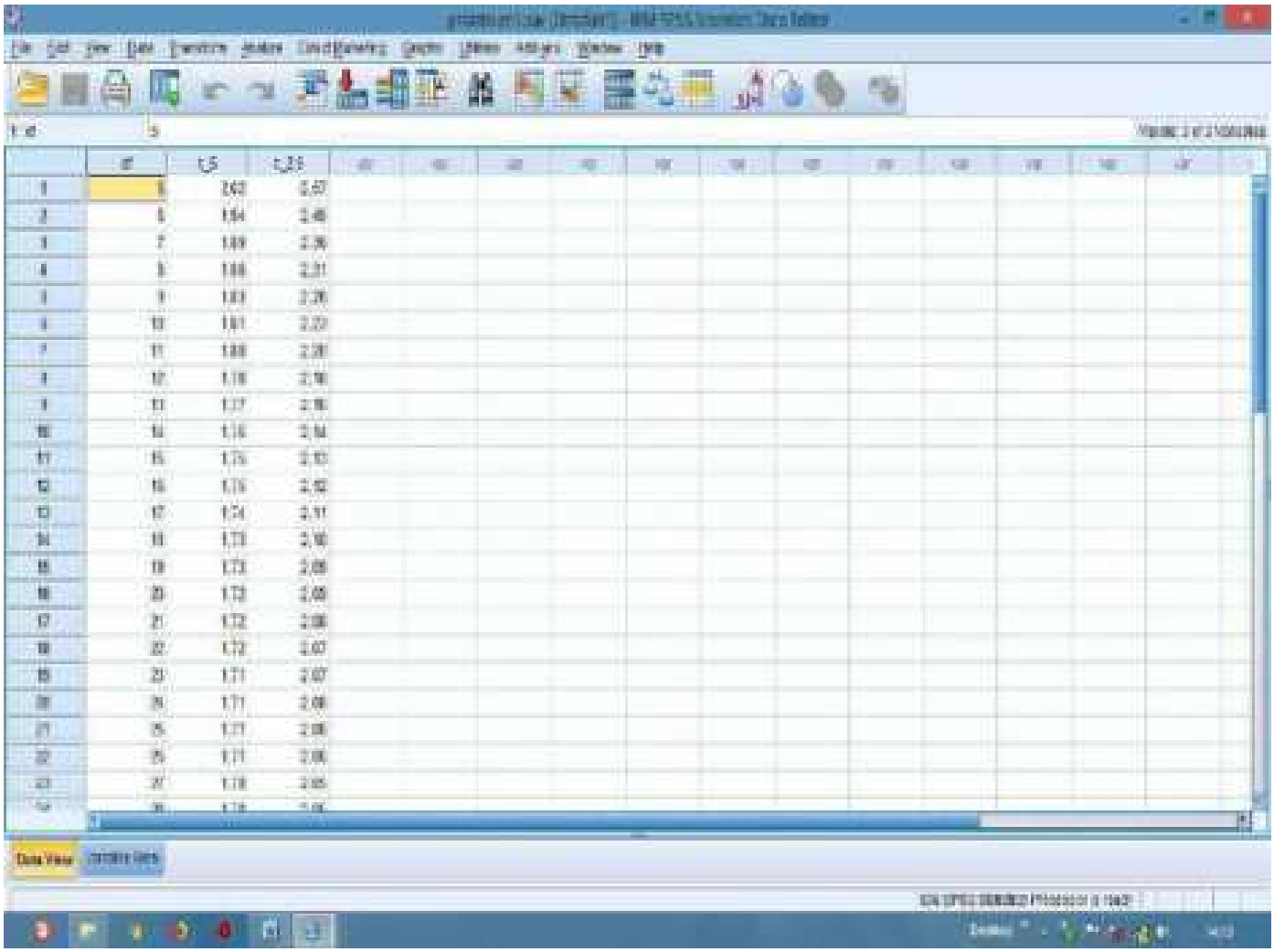


d. in the **target variable** box, fill in: t_5 (place / column to accommodate the calculation result)

e. in the **Function group** box, click (choose): **Inverse DF**

f. in the **Function and Special Variables** box, click (choose): **ldf.T** and click the up arrow button so that it goes into the **Numeric Expression** box:

g. fill in the brackets **(?,?)** with **(0.95, df)**, then click **OK**, so that in **the data view** it will appear the following results:



h. the above table is for **one-sided** test, eg **t value (0.95; 10) = 1.81** but for two-sided test the value of **t (0.95; 10) = 2.23**

2. F Table

To make F table , it needs 2 (two) degrees of freedom (df) that is **DF1** (numerator) and **DF2** (denominator / denominator) and level of significance (α). Because SPSS can not do calculations for two dimensions, then to create table F, DF1 is made constant. The steps are as follows:

a. Determine the degree of freedom for **DF1**, for example 3 and 4.

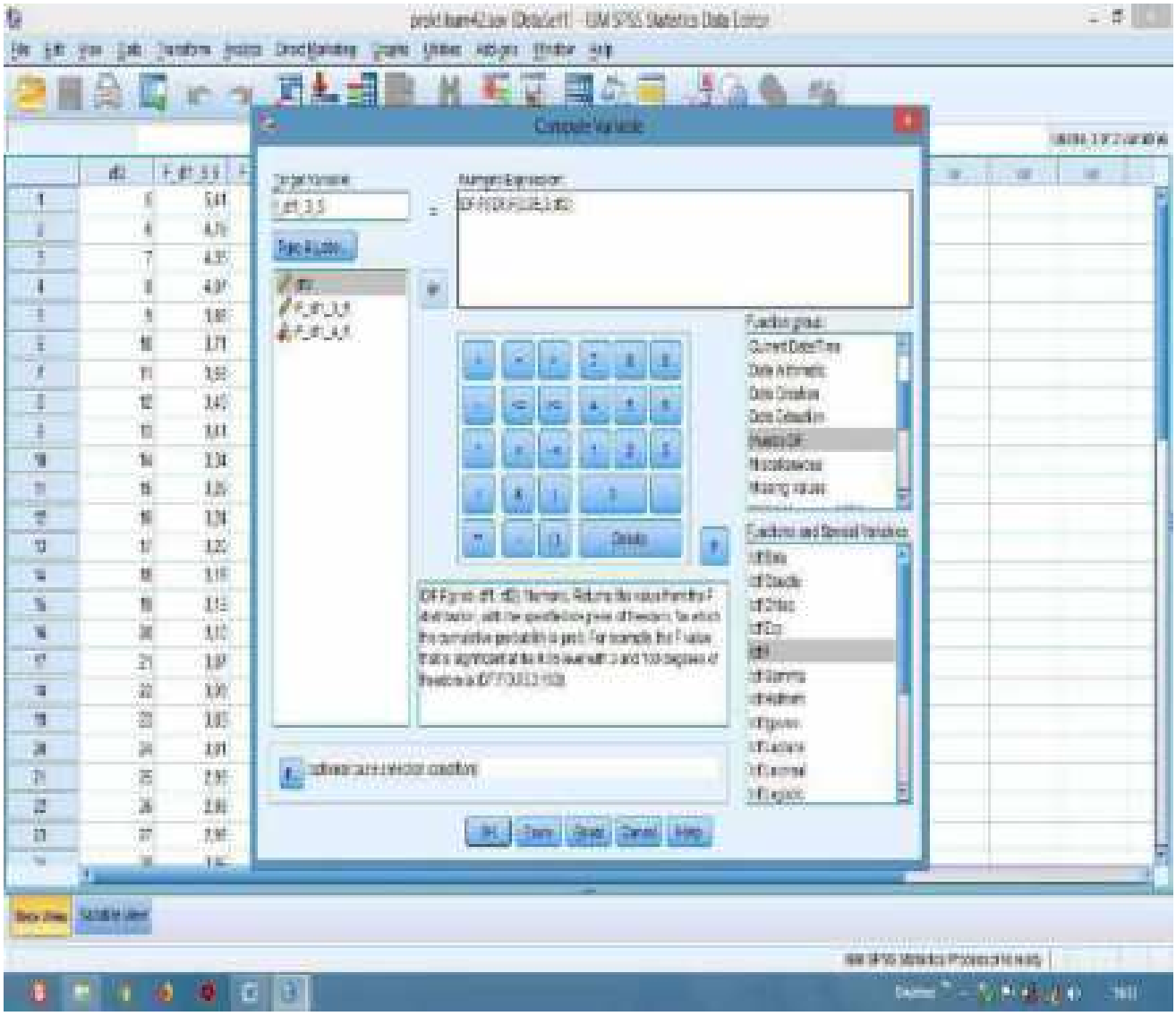
b. The variable name for **DF1** (numerator) is **F_df1_3** for df = 3 and **F_df1_4** for df = 4.

c. While the degrees of freedom for **DF2** (denominator) is: 5,6,7,8 ..... 30.

d. The writing of degrees of freedom **DF2** is sequentially down (column) and the given name is **df2.**

e. Determine the level of significance (α), eg: 95%, so **α** = (100-95)% = **5%**.

f. From the SPSS main menu, open **Transform → Compute Variable** so that the **Compute Variable dialog** box appears as follows:



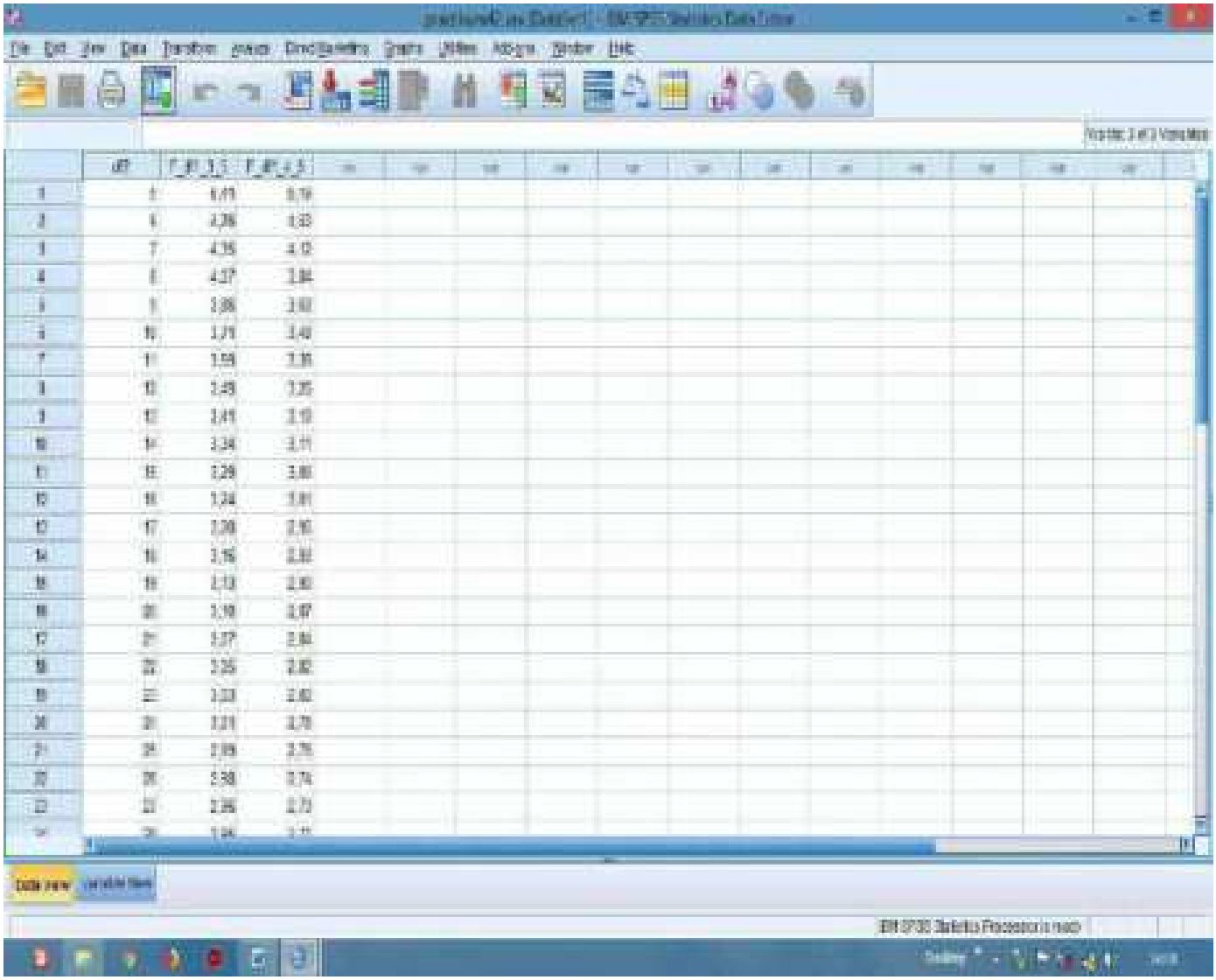
g. in the **Target Variable** box, fill in **F_df1_3_5** (place / column to accommodate the calculation result).

h. In the **Function group** box, click (choose): **Inverse DF**

i. In the **Function and Special Variables** box, click (choose): **Idf.F** and click the up arrow button to move to the **Numeric Expression** box

j. Fill in parenthesis **(?,?,?)** with **(0.95,3,df2)** and then click OK, so that in **Data View** will appear result in column **F_df1_3_5** like the following:

k. In the same way for **df = 4** on **DF1**, ie **(0.95,4, df2)** will appear the result in column **F_df1_4_5.**

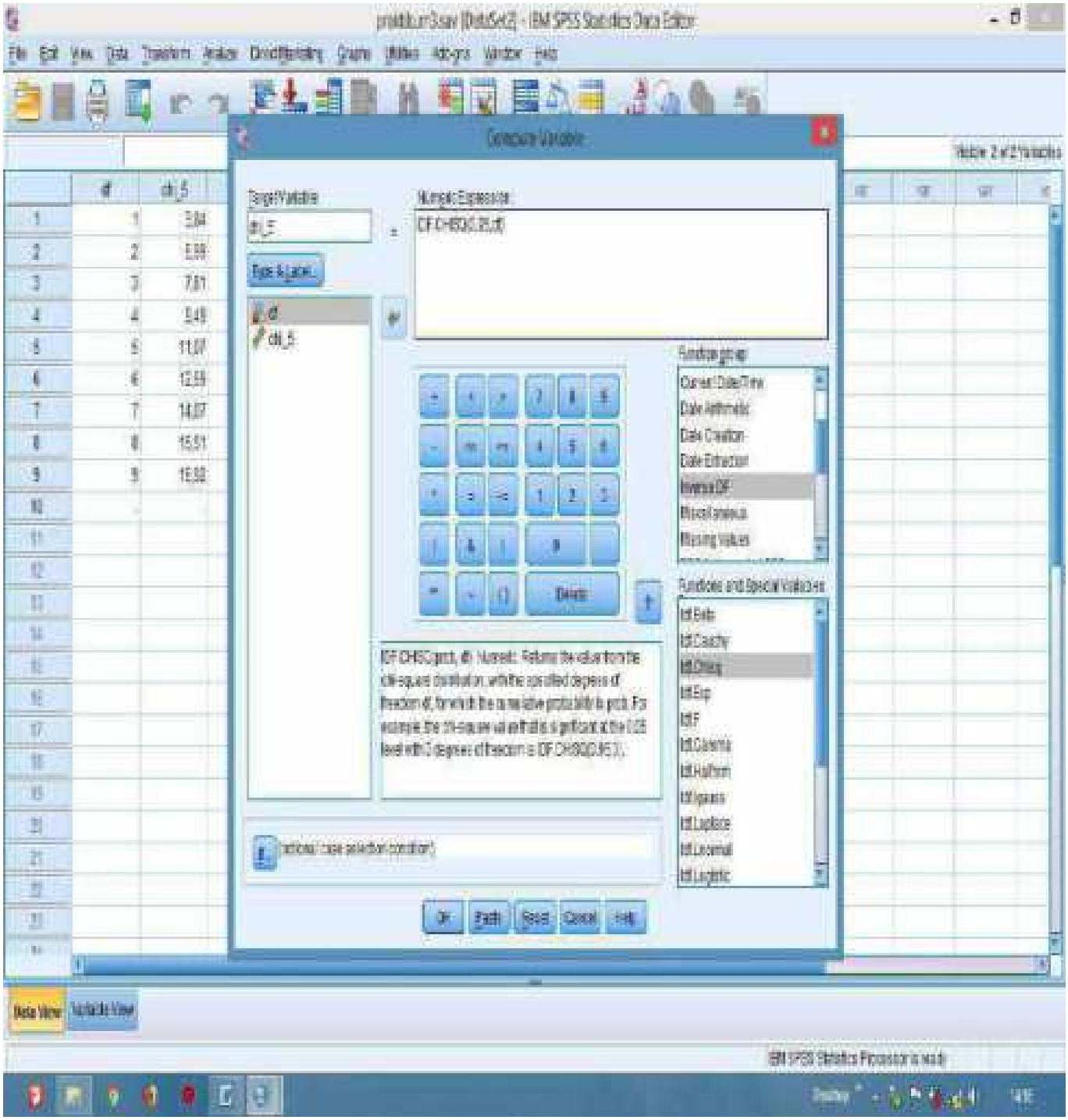


l. How to read table F for 95% significance level **(α)** with df1 = 3 and df2 = 10 then the value of F Table is **3.71** but for df1 = 4 the value of F table is **3.48.**

3. Chi Square Table

To create a Chi-Square table in need of degrees of freedom (df) and level of significance (α), the steps are as follows:

a. Determine the degree of freedom (df) that is going to be made, eg 1,2,3,4,5,6,7,8 .... 30. The writing of degrees of freedom (df) in SPSS is sequentially down (column) and the name of variable is **df**.
b. Make a df variable to accomodate the degrees of freedom by writing the numbers 1,2,3,4,5,6,7,8 .... 30 sequentially down (column)
c. Determine the level of significance (α), for example 5%
d. Make a **chi_5 variable** to accomodate the result / value of Chi-Square with α = 5%
e. From the SPSS main menu, open **Transform → Compute Variable** menu .. so the Compute Variable dialog box appears as follows:



f. In the **Target Variable** box, fill in: **chi_5** (place / column to accommodate the calculation result)

g. In the **Function group** box, click (choose): **Inverse DF**

h. In the **Functions and Special Variables** box, click (choose): **Idf.Chisq** and click on the up arrow button so that it moves to the **Numeric Expression** box

i. Fill in parenthesis **(?,?)** with (0.95, df) and then click **OK**, so in the **Data View** will appear the results in column **chi_5** like the following:

j. How to read the **Chi-square Table** for a 95% significance level (α) with df = 9 is that the Ch-Square value is **16.92.**

6. PRACTICUM OF NORMALITY TEST

1.PURPOSE

To test whether the data comes from the population which has normal distribution (Friedrich et al., 2017; Kim et al., 2018; Ostertagová & Ostertag, 2013; Solutions, 1918).

2. DATA

The following final project data is from English Education Department student "Danu Bimantara" entitled "Experimentation of English learning through Contextual Approach with Adjusted Games to Improve Students Reading Skills reviewed from Students' Learning Style Preference in SMA N 3 SEMARANG". The aim of the research is to show whether : a) There is a difference between English learning achievements of the students who follow the learning process t

hrough Contextual Approach with Adjusted Games with students who follow learning through conventional methods, b) There is a difference of the effect of the students' learning style on their learning achievements in reading skills.

No	Questionnaire		Pre Test		Post Test	
	Control	Experiment	Control	Experiment	Control	Experiment
1	A	K	66	76	91	69
2	K	V	65	78	76	65
3	A	V	75	69	87	92
4	V	V	75	67	72	85
5	V	A	87	71	68	58
6	K	A	82	74	61	69
7	V	A	84	81	57	73
8	V	V	66	67	68	81
9	K	A	70	73	68	73
10	K	K	70	73	49	77
11	A	V	74	65	76	92
12	A	K	64	68	53	54
13	A	V	67	65	80	69
14	K	K	79	65	57	62

15	A	K	79	78	76	54
16	K	V	80	79	57	77
17	V	A	77	69	64	85
18	A	K	73	70	64	81
19	A	A	71	74	72	65
20	A	V	72	71	64	62
21	K	A	80	70	49	58
22	V	A	92	75	61	77
23	K	V	75	68	68	72
24	V	V	78	80	53	81
25	V	V	75	61	76	96
26	A	A	66	73	80	85
27	A	A	70	69	76	69
28	K	K	84	90	61	65
29	V	K	77	79	80	69
30	K	K	62	73	57	81
31	V	K	91	73	53	69
32	K	V	76	82	49	73
33	A	A	80	63	61	69
34	V	V	77	71	64	85
35	V		80		57	
36	V		73		72	

Note: A (Auditorial); V (Visual); K (Kinesthetic)

3. PROBLEM/CASE

Will be tested whether the value of the data in the control class comes from the normally distributed population.

4. HIPOTHESIS

H_0 : The sample in the control class comes from the normally distributed population.

H_1 : Samples in the control class does not come from the normally distributed population.

5. BASIC DECISION-MAKING

Based on significance value (Probability)

H_0 is accepted if sig value > 0.05

H_0 is rejected if sig value < 0.05

6. CALCULATION WITH SPSS

a. choose menu ***Analyze, Descriptive Statistics, Explore***

b. after the normality test dialog box appears, then select **the initial test score data in control class and experiment class** as **dependent list,** click **plots** button, select ***normality test with plots*** and click continue ***OK.***

c. output result:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
PreTestControl	36	100.0%	0	0.0%	36	100.0%
PreTestExperiment	36	100.0%	0	0.0%	36	100.0%

Descriptives

			Statistic	Std. Error
PreTestControl	Mean		75.33	1.214
	95% Confidence Interval for Mean	Lower Bound	72.87	
		Upper Bound	77.80	
	5% Trimmed Mean		75.12	
	Median		75.00	
	Variance		53.029	
	Std. Deviation		7.282	
	Minimum		62	
	Maximum		92	
	Range		30	
	Interquartile Range		10	
	Skewness		.286	.393
	Kurtosis		-.120	.768
PreTestExperiment	Mean		72.69	1.023
	95% Confidence Interval for Mean	Lower Bound	70.62	
		Upper Bound	74.77	
	5% Trimmed Mean		72.53	
	Median		73.00	
	Variance		37.647	

Std. Deviation	6.136	
Minimum	61	
Maximum	90	
Range	29	
Interquartile Range	10	
Skewness	.474	.393
Kurtosis	.427	.768

Tests of Normality

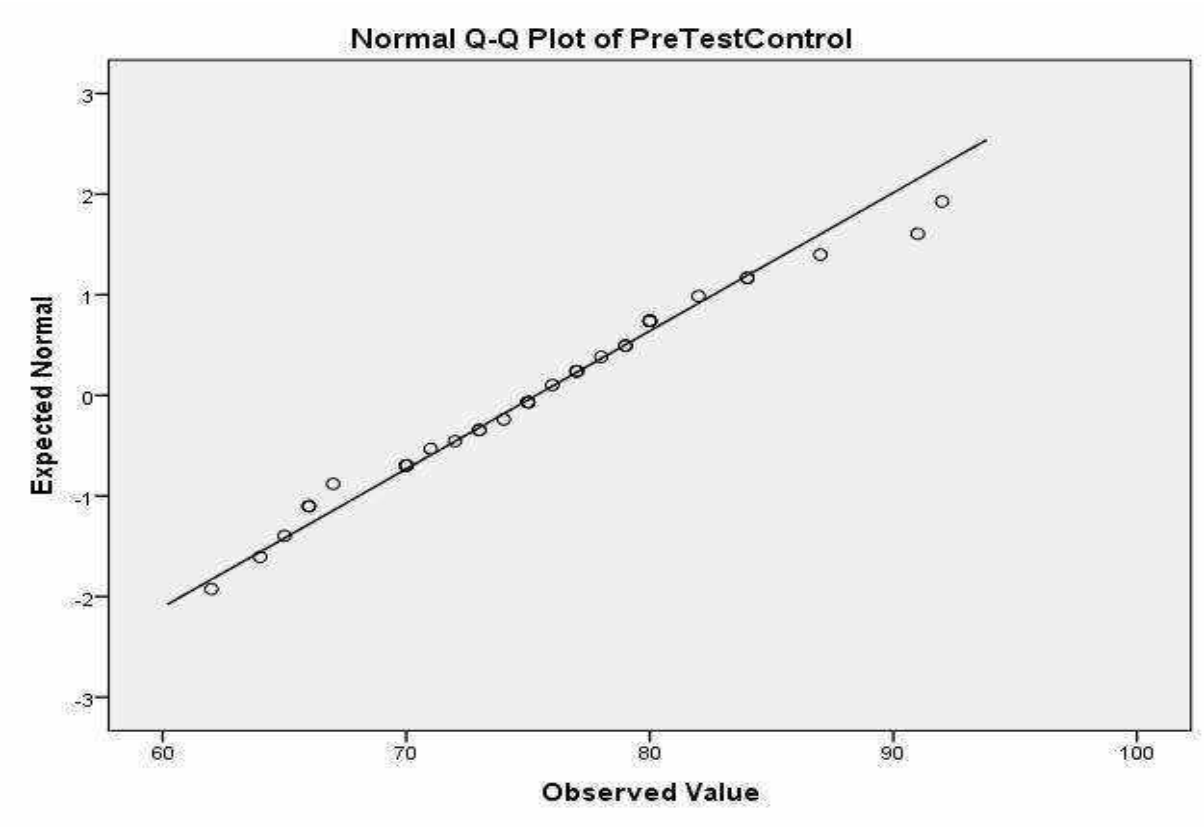
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreTestControl	.094	36	.200*	.976	36	.626
PreTestExperiment	.091	36	.200*	.977	36	.648

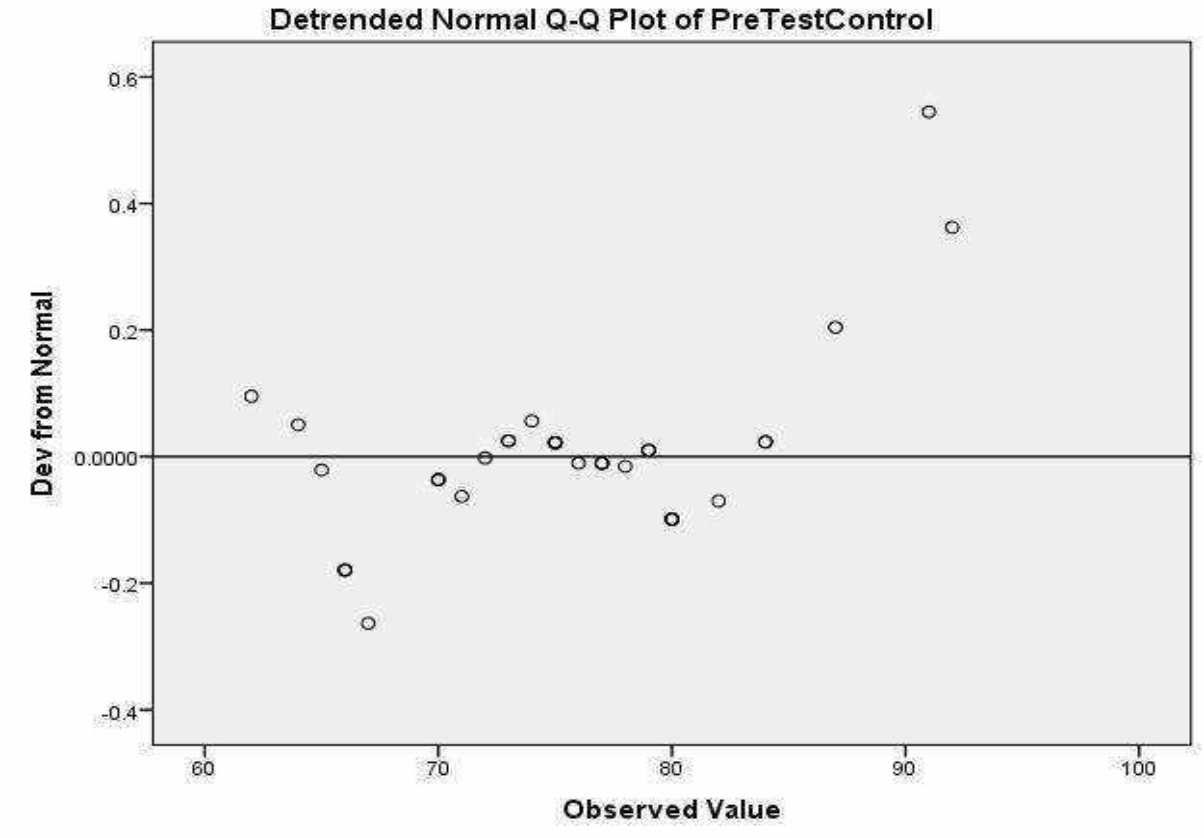
*. This is a lower bound of the true significance.

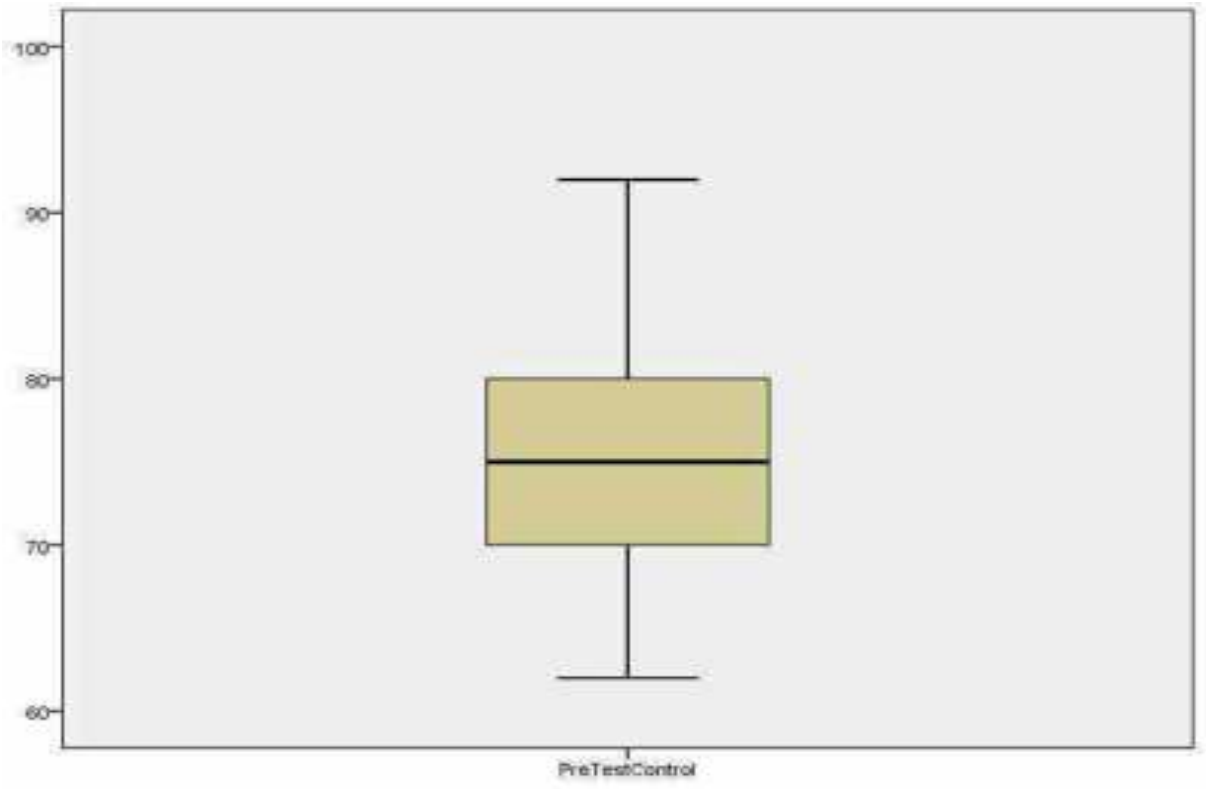
a. Lilliefors Significance Correction

PreTestControl

```
PreTestControl Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

     2,00        6 .  24
     5,00        6 .  56667
     8,00        7 .  00012334
    11,00        7 .  55556777899
     7,00        8 .  0000244
     1,00        8 .  7
     2,00        9 .  12

 Stem width:        10
 Each leaf:       1 case(s)
```

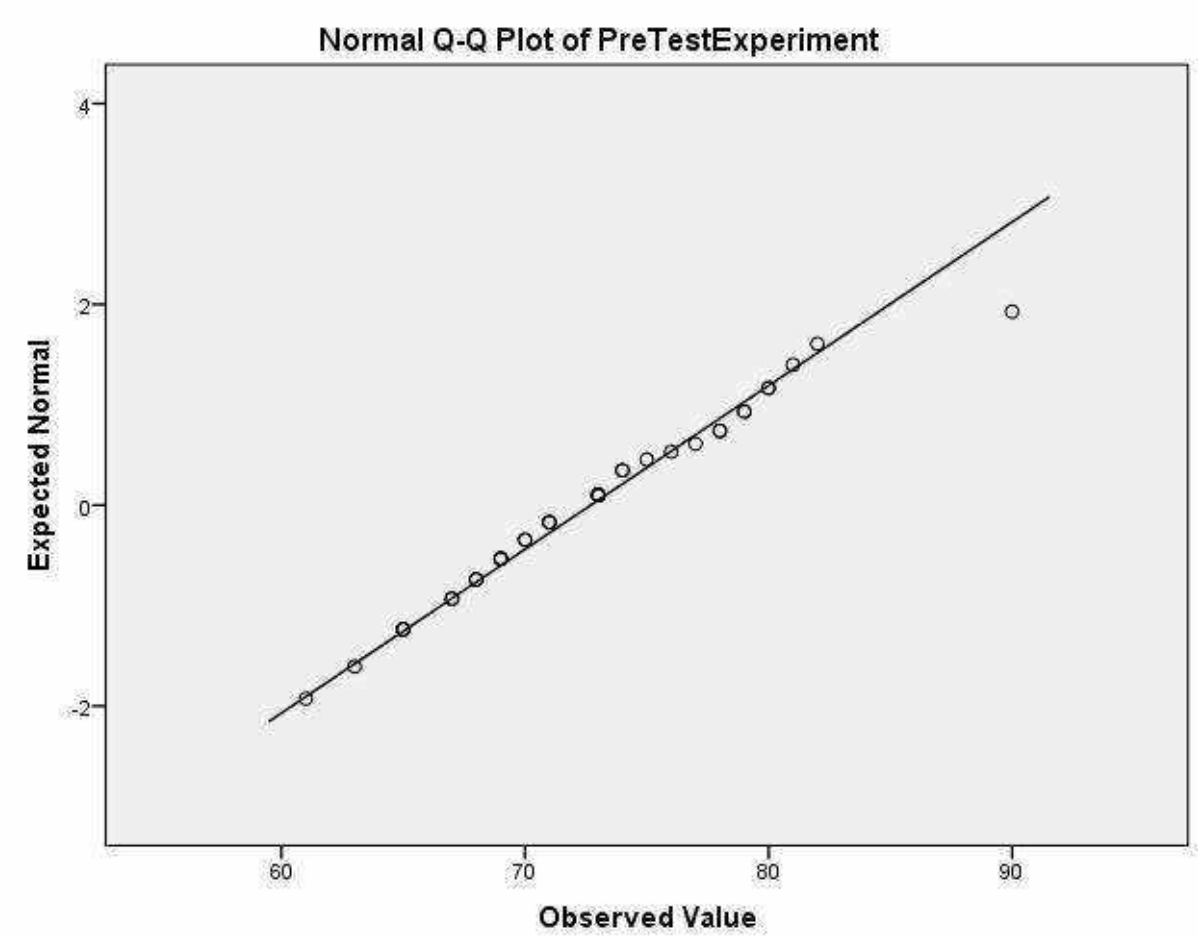

Normal Q-Q Plot of PreTestControl
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
60
70
80
90
100

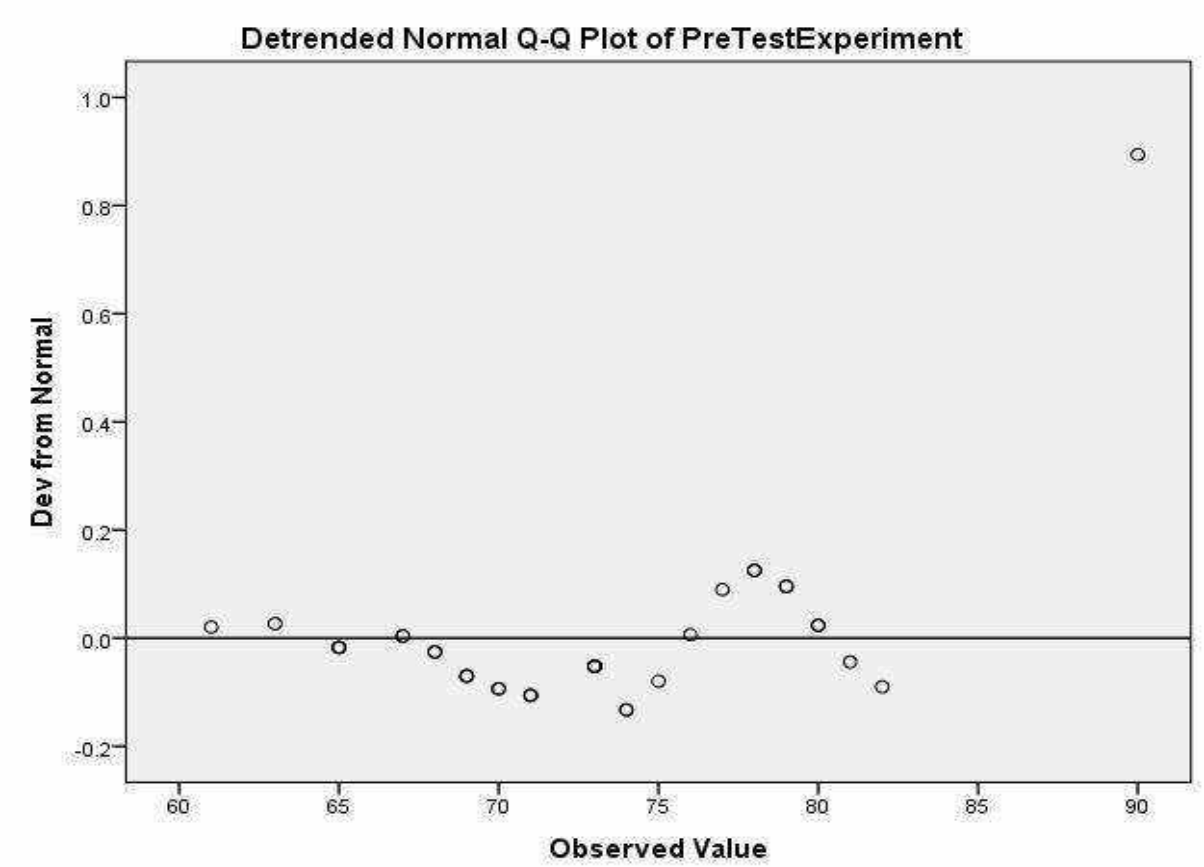

Detrended Normal Q-Q Plot of PreTestControl
Dev from Normal
Observed Value
0.6
0.4
0.2
0.0000
-0.2
-0.4
60
70
80
90
100

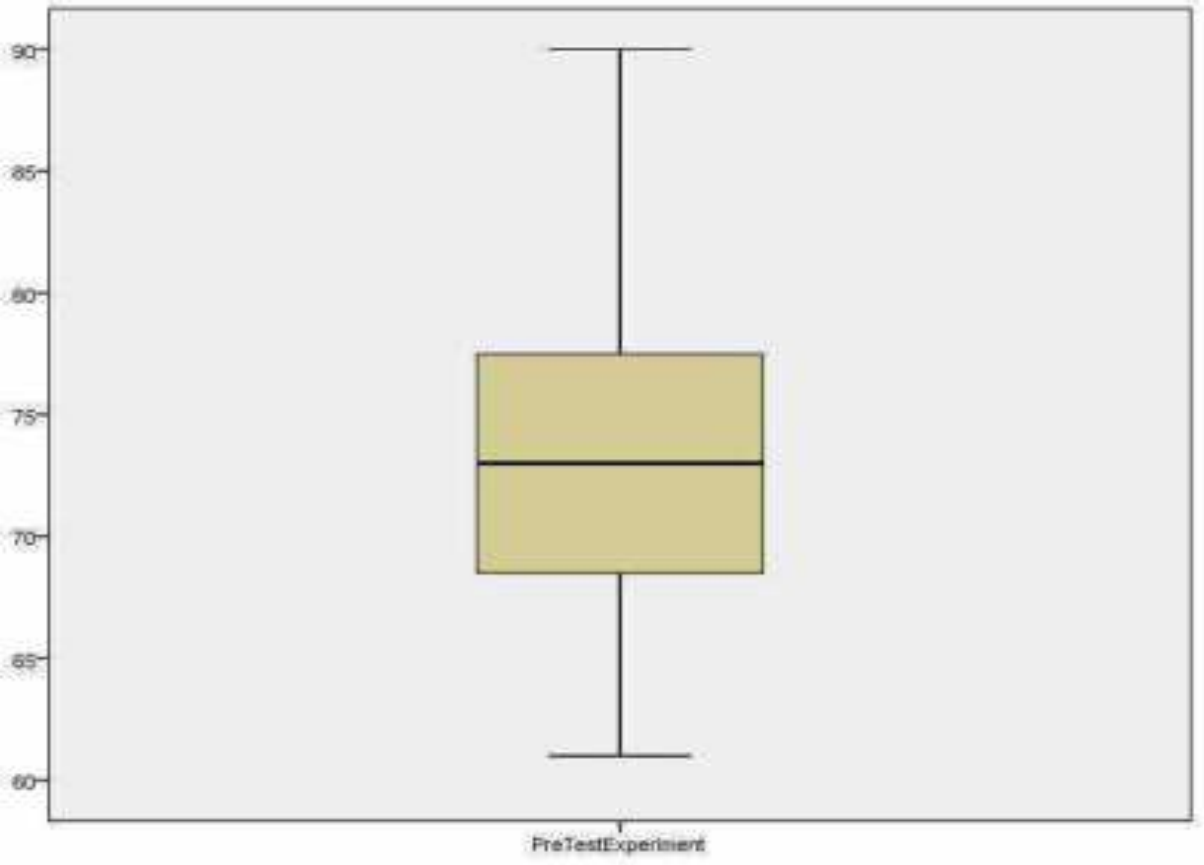


PreTestExperiment

```
PreTestExperiment Stem-and-Leaf Plot

 Frequency    Stem &  Leaf

     2,00        6 .  13
    10,00        6 .  5557788999
    12,00        7 .  001113333344
     7,00        7 .  5678899
     4,00        8 .  0012
      ,00        8 .
     1,00        9 .  0

 Stem width:        10
 Each leaf:       1 case(s)
```


Normal Q-Q Plot of PreTestExperiment
Expected Normal
Observed Value
4
2
0
-2
60
70
80
90


Detrended Normal Q-Q Plot of PreTestExperiment
Dev from Normal
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
60
65
70
75
80
85
90
Observed Value


90
85
80
75
70
65
60
PreTestExperiment

7. THE TEST DECISION

Based on the sig value in the ***test of normality*** table, it is obtained that the sig value at the pre test of the control class (control 1) is 0.626 and the post test of the control class is (control 2) 0.290, because 0.626 > 0.05 and 0.290 > 0.05 so, H_0 is **ACCEPTED**.

8. CONCLUSION

The sample in the control class comes from the normally distributed population.

PRACTICUM 5 DATA

The source of data from:……..

No	Pre Test		Post Test	
	Control	Eksperiment	Control	Eksperiment

7. PRACTICE OFHOMOGENEITY TEST

SPSS (Statistical Product and Service Solutions)

1. PURPOSE

To show that two or more sample of data of groups come from the same populations or variance (homogeneous) (Friedrich et al., 2017; Rusydi & Fadhli, 2018; Singh, Kumar, 2006; Singpurwalla & Lai, 2020).

2. DATA

No	Pre Test		Post Test	
	Control	Experiment	Control	Experiment
1	66	76	91	69
2	65	78	76	65
3	75	69	87	92
4	75	67	72	85
5	87	71	68	58
6	82	74	61	69
7	84	81	57	73
8	66	67	68	81
9	70	73	68	73
10	70	73	49	77
11	74	65	76	92
12	64	68	53	54
13	67	65	80	69
14	79	65	57	62
15	79	78	76	54
16	80	79	57	77
17	77	69	64	85
18	73	70	64	81

19	71	74	72	65
20	72	71	64	62
21	80	70	49	58
22	92	75	61	77
23	75	68	68	72
24	78	80	53	81
25	75	61	76	96
26	66	73	80	85
27	70	69	76	69
28	84	90	61	65
29	77	79	80	69
30	62	73	57	81
31	91	73	53	69
32	76	82	49	73
33	80	63	61	69
34	77	71	64	85
35	80		57	
36	73		72	

3. PROBLEM/CASE

In this case, the researcher will test whether the score of the data in the control class and the experimental class have the same variance (homogeneous).

a. HYPOTHESIS

H_0: $\delta^2_{Kontrol} = \delta^2_{Eksp}$

H_1: $\delta^2_{Kontrol} \neq \delta^2_{Eksp}$

b. BASIC DECISION-MAKING

Based on the value of significance (probability)

H_0 is accepted if the value sig. > 0.05

H_0 is rejected if the value sig. < 0.05

4. CALCULATION WITH SPSS

a. Open the data file that is going to be analyzed

b. Copy the data of pre-test of the control class and the experiment class into the SPSS worksheet, put it in one column and keep in mind the serial number 1-36 are control class and 37-70 experiment class, then in the second column the contents with "**1**" to **control** class and "**2**" to **experiment** class.

c. Create variable names by way of variable view, then on the label column name the "**Contextual Approach**" on VAR000001 and "**Learning Style**" on VAR000002

d. Then in the **value** column on VAR000002 click **none** until a dialog box appear

e. Fill in the value coloumn with "**1**", label with "**Control**" than Add, then with "**2**", label with "**Experiment**" than click **Add** and click **OK**

f. Do the homogeneity test with ***Lavene Statistic*** test by selecting the menu: ***Analyze → compare means → one-way anova.***

g. Input "**Contextual Approach**" to the box **Dependent list** and "**Learning Style**" to the box **Factor.**

h. Click menu **Option** and choose ***Homogeneity of variance test***, then click **Continue**.

i. Then click **OK** so the result will appear (output).

Test of Homogenity of Variances

Contextual Approach

Levence Statistics	df1	df2	Sig.
.867	1	68	.355

Read in test homogeneity

5. **TEST DECISION**

Based on the results of the table ***Test of Homogeneity of Variances*** table it is obtained **sig. value = 0.355**, because of sig. value 0/355 > 0.005 so **H_0 is ACCEPTED.**

6. **CONCLUSION**

The variance of the population in the control class and the experimental class is the same (homogeneous).

8. SPSS Test on One Sample t-test

One sample t test fundamental concepts

1. The one-sample t test is also known as the t test for one sample.

2. The purpose of the one-sample t test is to compare the average of the sample under study with the average of the existing population.

3. One sample t test can also be used to test hypotheses in descriptive statistics.

4. One sample t test is part of parametric statistics. Therefore, the basic assumption that must be met is that the research data must distribute normally (Ave, 1999; Chakrabarty, 2018; Cicchitelli, 1989; Copyright & Companies, 2010; Friedrich et al., 2017; Garth, 2008; Ostertagová & Ostertag, 2013; Parthiban & Gajivaradhan, 2016).

ONE SAMPLE t TEST EXAMPLE

A researcher made a conjecture stating that "the average score of student learning outcomes in Speaking for Academic Purposes Course who are active in English Community Club is equal to 80".

To prove this, the researcher chose randomly 12 students who were active in English Community Club.

The average score of the learning outcomes of the 12 students is as follows.

NO.	AVERAGE LEARNING RESULTS
1	79,2
2	75,6
3	81,4
4	82,3
5	76
6	76,7
7	74,4
8	84,4
9	77,4
10	74,8
11	82,6
12	78

CATATAN:

Data is the average score of student report book in the midterm 1 test (UTS)

RESEARCH DATA ANALYSIS WITH SPSS

1. Conduct a normality test to find out whether the average score of student learning outcomes in Speakin for Specific Purposes who are active in English Community Club is normally distributed or not as a requirement for one sample t test in Parametric Statistics.
2. Perform a one sample t test.
3. ANALYSIS STAGE

   INPUT -->ANALYSIS -->OUTPUT

DECISION BASED ON NORMALITY TEST

If the sig. value > 0.05, the data distribute normally.

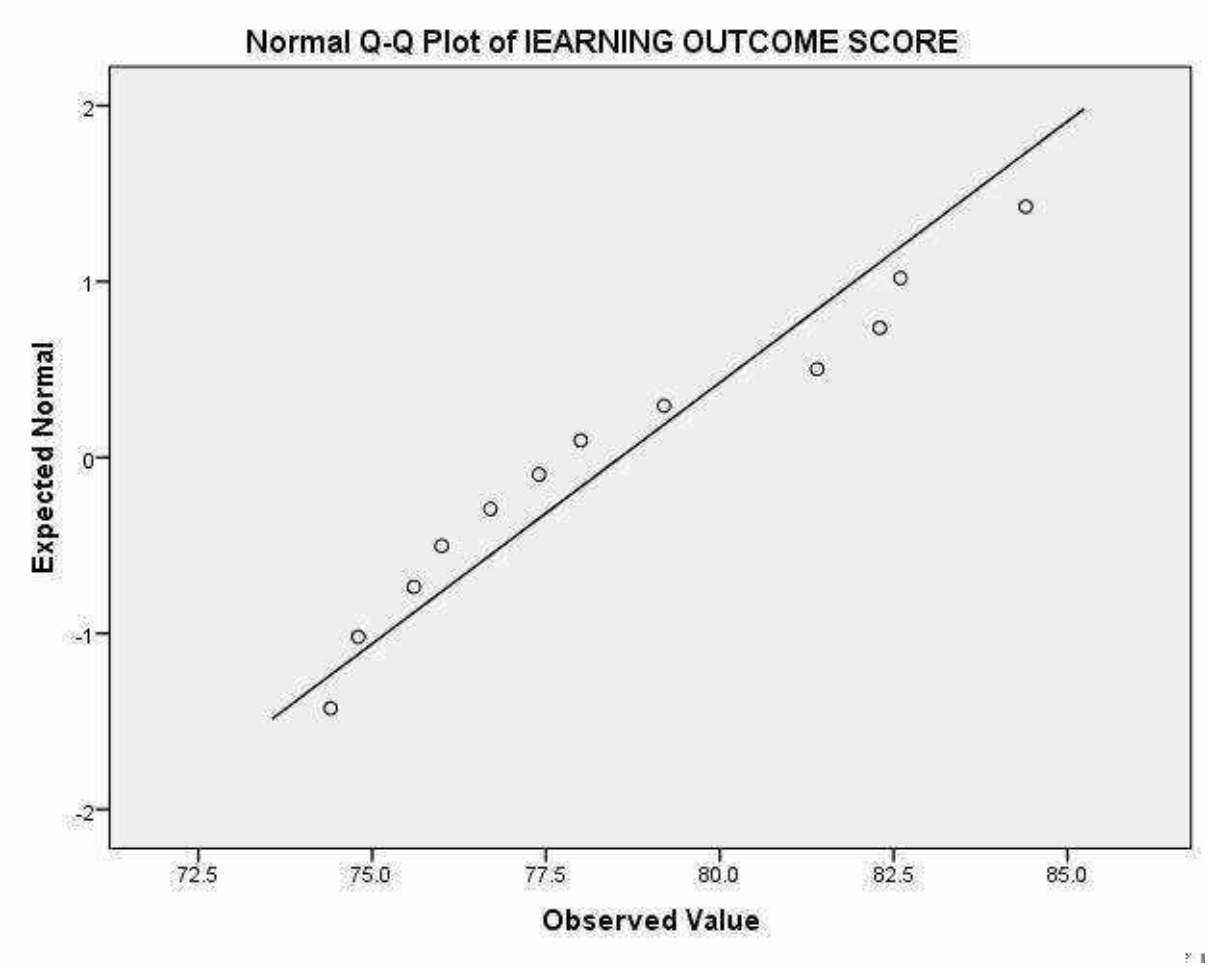
If the value of sig. < 0.05, then the data do not distribute normally.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
lEARNING OUTCOME SCORE	.150	12	.200*	.926	12	.337

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction



RESEARCH HYPOTHESIS

H0 = The average score of student learning outcomes who are active in English Community Club is the same as 80.

Ha = The average score of student learning outcomes who are active in English is not the same as 80.

ONE SAMPLE t TEST TEST BASIC DECISIONS

The basis for decision making in the one sample t test can be done in 3 ways:

1. Comparing the value of Sig (2-tailed) with 0.05.

2. Comparing the value of tcount with ttable.

3. Look at the comparison of the value of tcount with ttable with a curve.

1. BASIC DECISIONS BASED ON SIG VALUE

If the value of Sig. (2-tailed) < 0.05, then H0 is rejected.

If the value of Sig. (2-tailed) > 0.05, then H0 is accepted.

Decision: Due to the value of Sig. (2-tailed) of 0.168 > 0.05, then according to the basis of decision making above, H0 is accepted. Thus, it can be interpreted that the average score of the English learning outcomes of students who are active in English Community Club is 80.

One-Sample Test

	Test Value = 80					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
lEARNING OUTCOME SCORE	-1.474	11	.168	-1.4333	-3.573	.706

2. COMPARISON OF THE VALUE OF tcount with ttable

If the value of tcount > ttable, then H0 is rejected.

If the value of tcount < ttable, then H0 is accepted.

Decision: Because the tcount is -1.474 < ttable 2,201, then H0 is accepted. So it can be concluded that the average score of student English learning outcomes who are active in English Community club is 80.

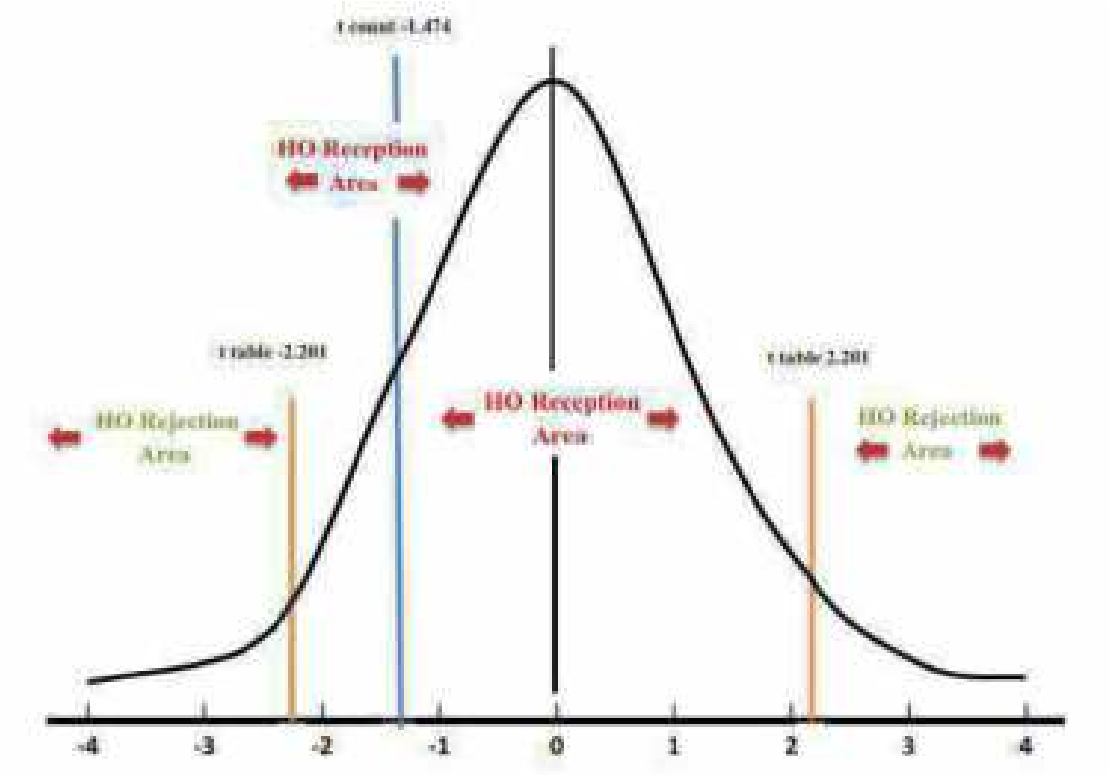
Formula to find t-table

= 0.05/2; df

= (0.025; 11)

Then look at the distribution of statistical t-table values. It is found that the t-table value is 2.201

3. BASIC DECISIONS BASED ON THE CURVE



Based on the curve above, it can be concluded that H0 is accepted. So it can be interpreted that the average score of student English learning outcomes who are active in English Community Club is not the same as the score of 80.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
lEARNING OUTCOME SCORE	12	78.567	3.3679	.9722

One-Sample Test

	Test Value = 80					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
lEARNING OUTCOME SCORE	-1.474	11	.168	-1.4333	-3.573	.706

9. Paired Sample t Test analyzed with SPSS 21

BASIC CONCEPTS OF PAIRED SAMPLE T-TEST

✓ Paired sample t test is used to determine whether there are the difference in the mean of the two paired samples.
✓ The two paired samples in paired sample t test are the same sample but has two data.
✓ The test conducted in paired sample t test is part of parametric statistics, therefore, as the rules in parametric statistics, research data must distribute normally (Everitt & Skrondal, 2006; Garth, 2008; Kim et al., 2018; Orwa et al., 2014; Wagner, 2015).

PAIRED SAMPLE t TEST EXAMPLE

A researcher would like to undergo a research in which the aim of a research is to determine the effect of cooperative learning model of Teams Games Tournament (TGT) type on students' English learning outcome.

To prove this, the researcher chose an English class that consists of 22 students.

The research method is quantitative with One Group Pretest-Posttest Design. Data collection techniques use experiments and direct observation, while one of the instruments is an English speaking test. Data analysis is t-test from pretest and posttest data.

The average result of the learning outcomes of the 22 students is as follows. (*go to excel data*)

RESEARCH DATA ANALYSIS WITH SPSS

1. Conduct a normality test to find out whether the average result of student English learning outcomes is normally distributed or not as a requirement for paired sample t test in Parametric Statistics.
2. Perform a paired sample t test.
3. ANALYSIS STAGE

INPUT -->ANALYSIS -->OUTPUT

(*open SPSS 21 for inputting data from excel, do normality test*)

DECISION BASED ON NORMALITY TEST

If the sig. value > 0.05, the data distribute normally.

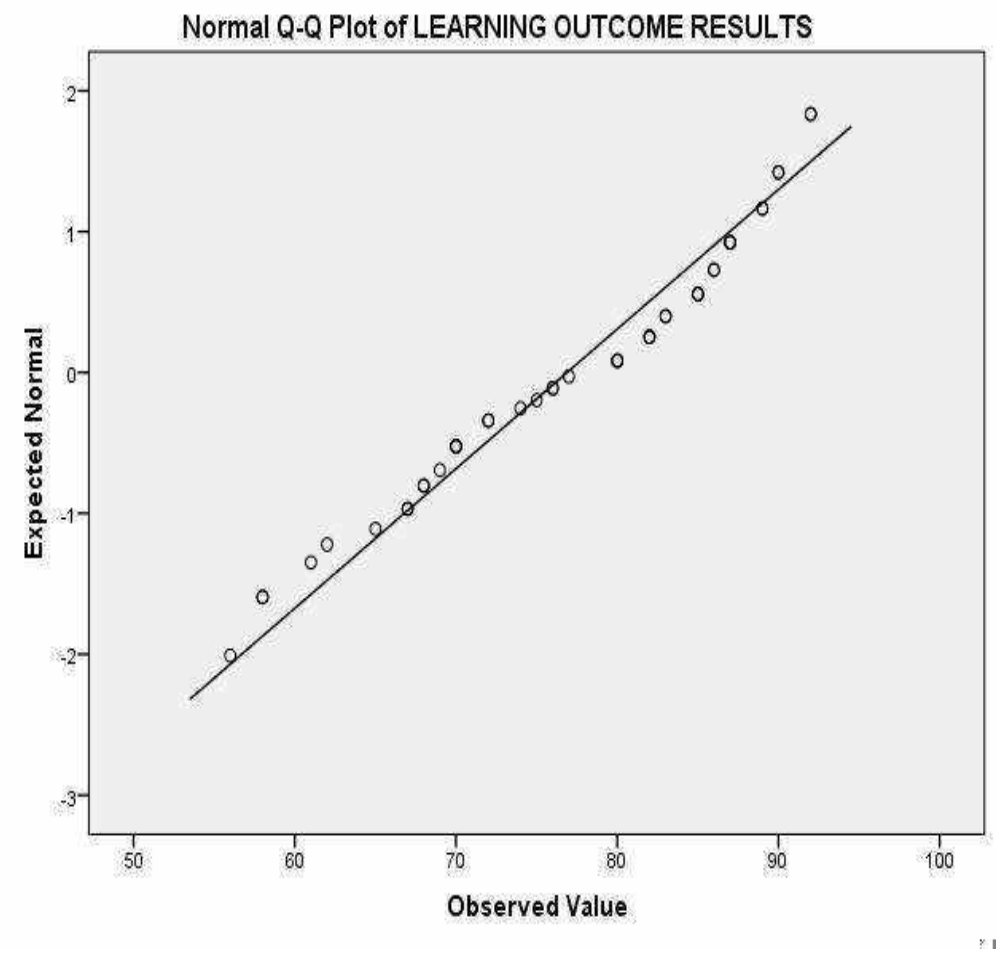
If the value of sig. < 0.05, then the data do not distribute normally.

If the data distribute normally, go to Paired sample t test.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LEARNING OUTCOME RESULTS	.126	44	.079	.950	44	.055

a. Lilliefors Significance Correction



SPSS OUTPUT INTERPRETATION

FIRST OUTPUT

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE TEST	69.2273	22	6.10177	1.30090
	POST TEST	86.5455	22	3.76358	.80240

This output shows the summary results of descriptive statistics from both samples or pretest and posttest data. (Mean, N, Std. Deviation, Std. Error Mean that explain statistics descriptive)

SECOND OUTPUT

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRE TEST & POST TEST	22	-.234	.295

The second part of the output is the result of the correlation or relationship between the two data or variables, namely Pretest and Posttest.
The second output explains whether there is relations between pre test and posttest. It is found that the significance is 0.295 > 0.05 it means there is no relation between pre test and post test.

THIRD OUTPUT

Paired Samples Test

	Paired Differences	t	df	Sig. (2-

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				tailed)
					Lower	Upper			
Pair 1	PRE TEST - POST TEST	-17.31818	7.88239	1.68053	-20.81304	-13.82333	-10.305	21	.000

BASIC DECISION MAKING FOR PAIRED SAMPLE T TEST

1. If the value of Sig. (2-tailed) < 0.05, then there is a significant difference between learning outcomes in pretest and posttest data.
2. If the value of Sig. (2-tailed) > 0.05, then there is no significant difference between learning outcomes in pretest and posttest data.

DECISION-MAKING

It is known that the value of Sig. (2-tailed) is 0.000 < 0.05, so we can conclude that there is a significant difference between the results of learning English in the Pretest and Posttest data.

Through the cooperative learning method with TGT type, it can improve the English learning outcome. Thus, the result of paired sample t tests shows there is a significance difference between the results of learning English in the Pre test and post test scores.

The other ways can be done to detect the significance difference through the comparison of tcount and ttable. But significance 2 tailed is effective and accurate enough to find whether there is significance difference or not.

PAIRED SAMPLE T TEST
SPSS TUTORIAL & PRACTICE

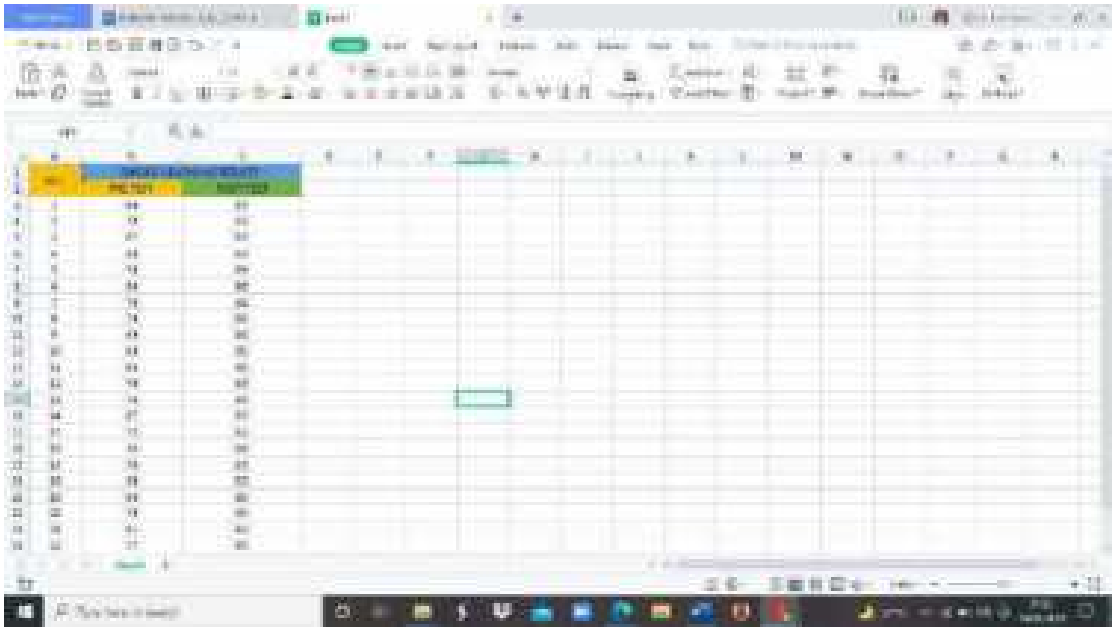
PAIRED SAMPLE T TEST:Sig.Value 0,05.Normality Test :Parametric Statistics.

FIRST step install SPSS in Your PC

Basic Concepts of Paired Sample T-Test

a. Paired sample t test is used to determine whether there are the difference in the mean of two paired samples.
b. The two paired samples in paired sample t test are same sample but has two data.
c. The test conducted in paired sample t test is part of parametric statistics,therefore ,as the rules in parametric statistics,research data must distribute normally.

1. Go to excel word , and enter the data for accuracy data.



Paired sample t test EXAMPLE :
A researcher would like to undergo a research in which the aim of a research is to determine the effect of cooperative learning model of Terms Games Tournament (TGT)type on students' English Learning outcome.

To provide this, the researcher chose an English class that consist of 22 students. The research method is quantitative with One group pre test -post test design data collection technique use experiments and direct observation ,while one of the instruments is an English speaking test.Data anaysis is t test from pre test and post test.

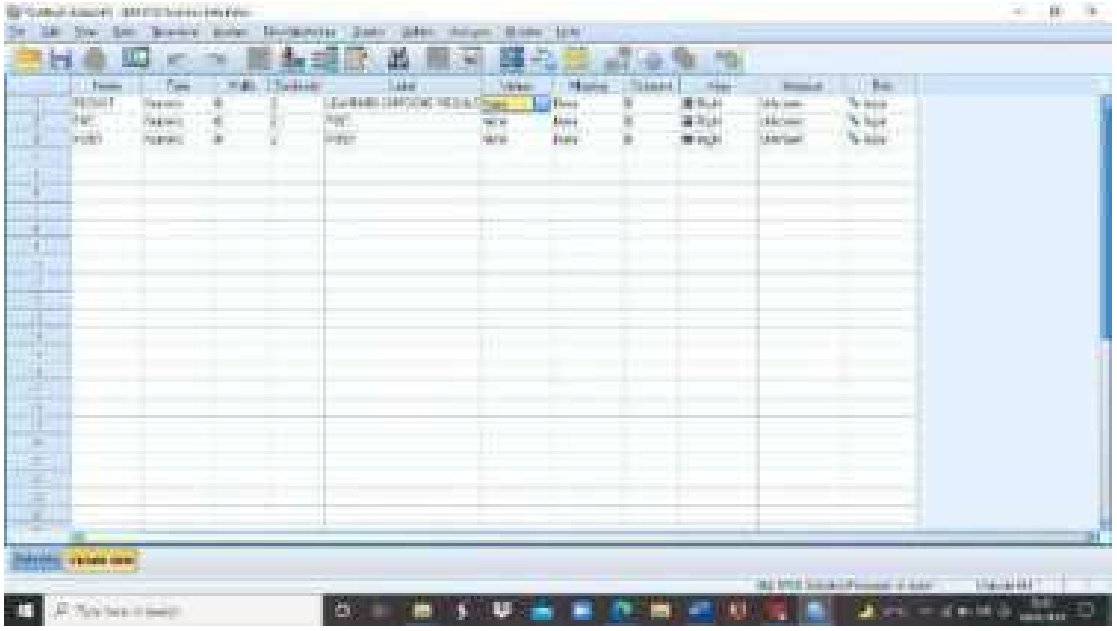
The average result of the learning outcomes of the 22 students is

as follows . RESEARCH DATA ANAYSIS WITH SPSS

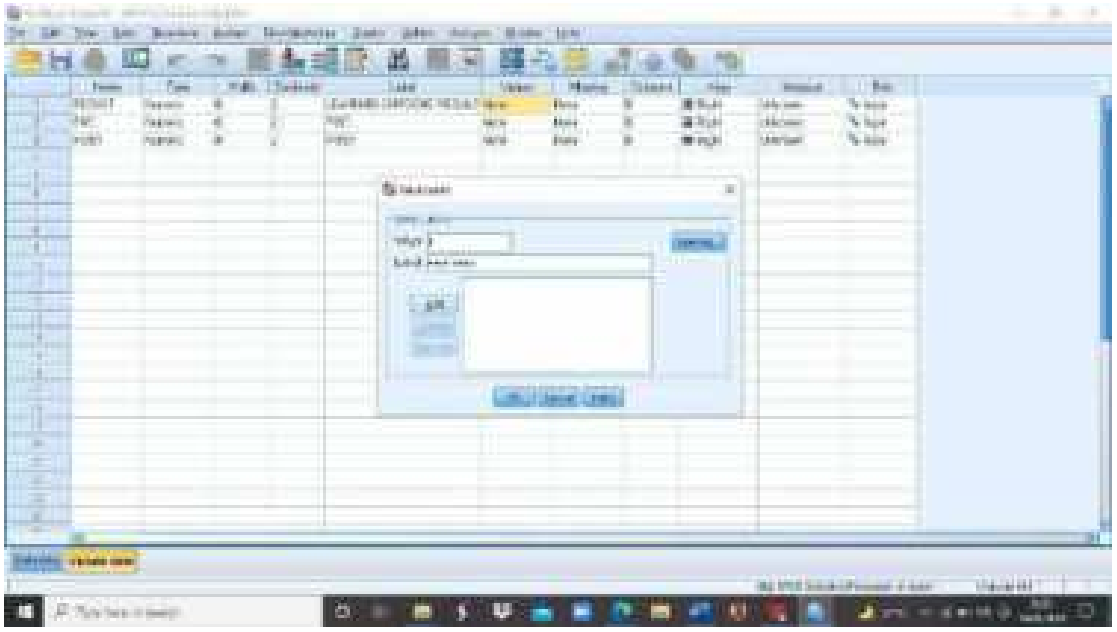
1. Conduct a normality test to find out whether the average result of student english learning outcomes is normality distributed or not as a requirement for paired sample t test in Parametric statistics.
2. Perform a paired sample t test
3. ANAYSIS STAGE

INPUT -ANALYSIS -OUTPUT

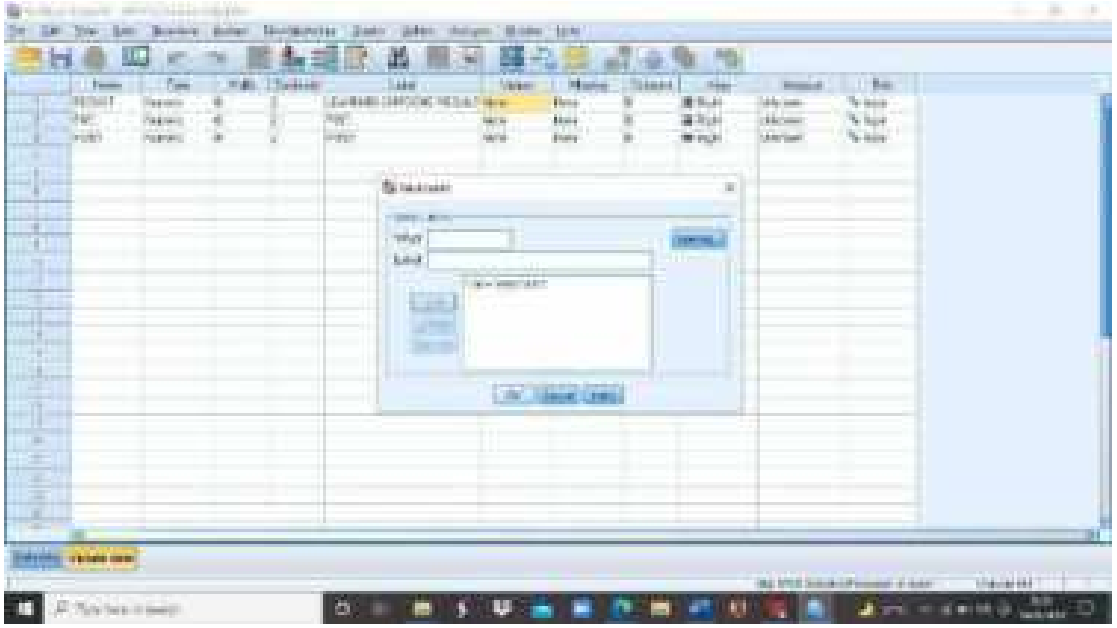
2. OPEN SPSS 21 For inputing data from excel do normality test.

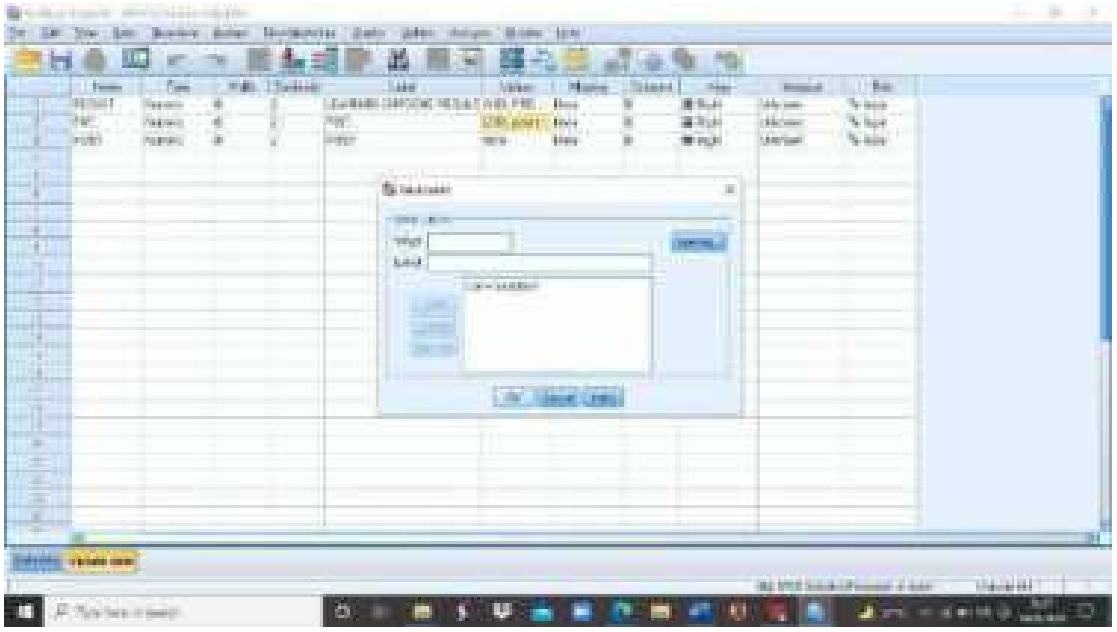


THEN , go to values, click and type values:1 , and label : pre test and then click ADD

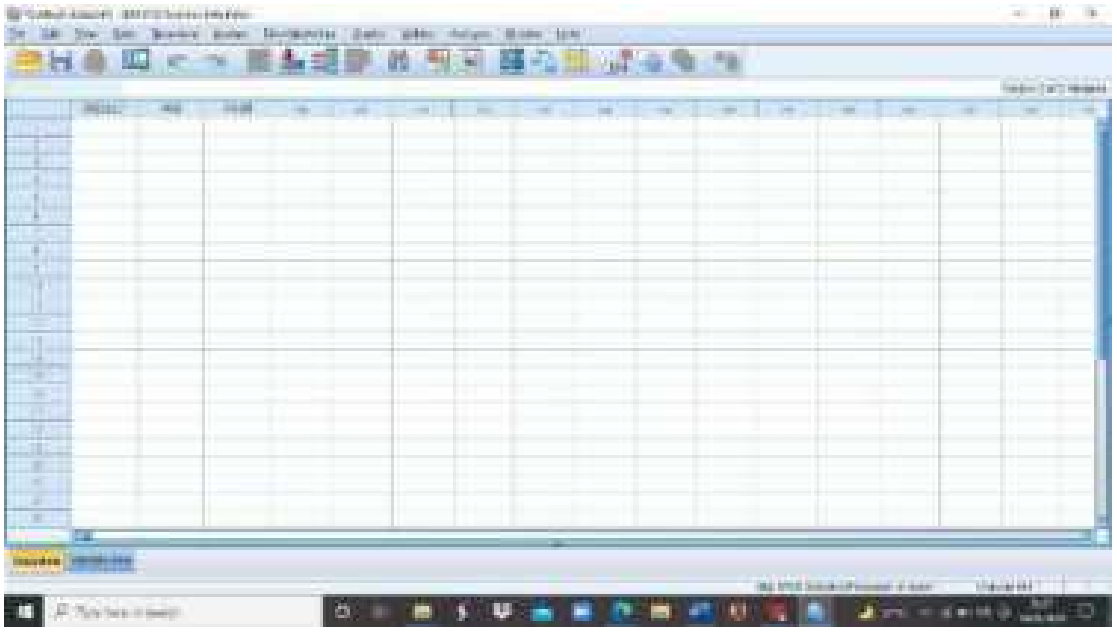


Click ok

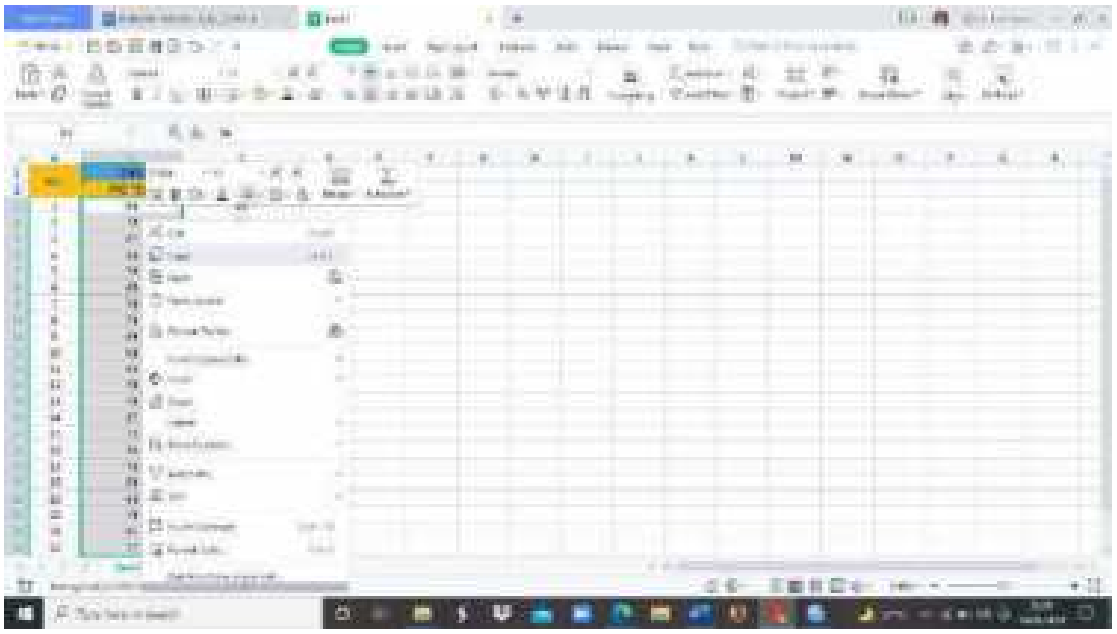




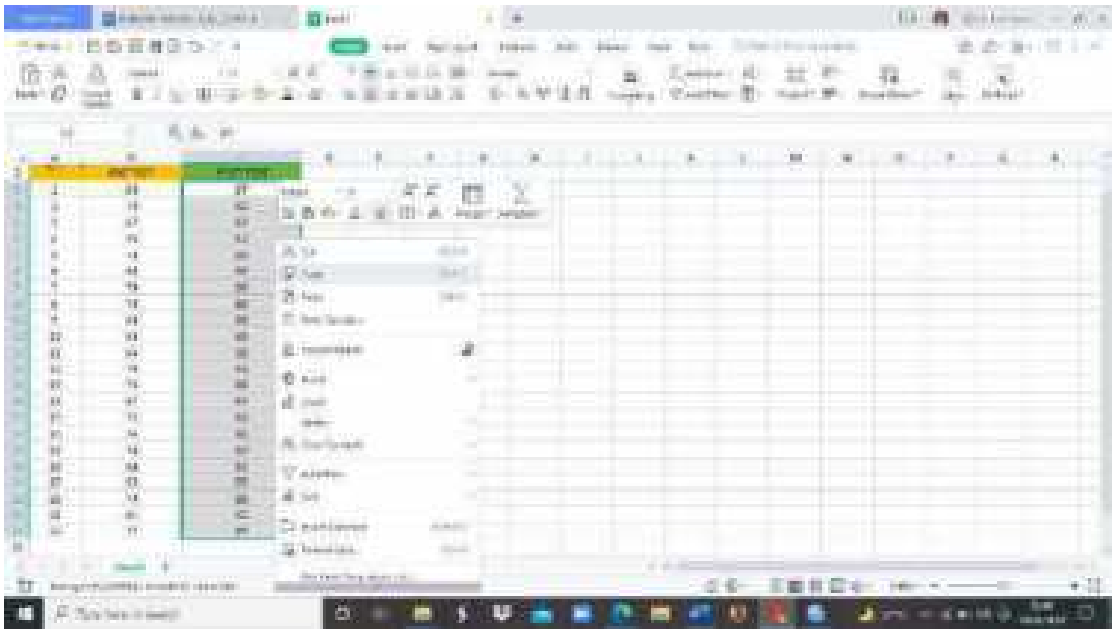
3,Click Data view

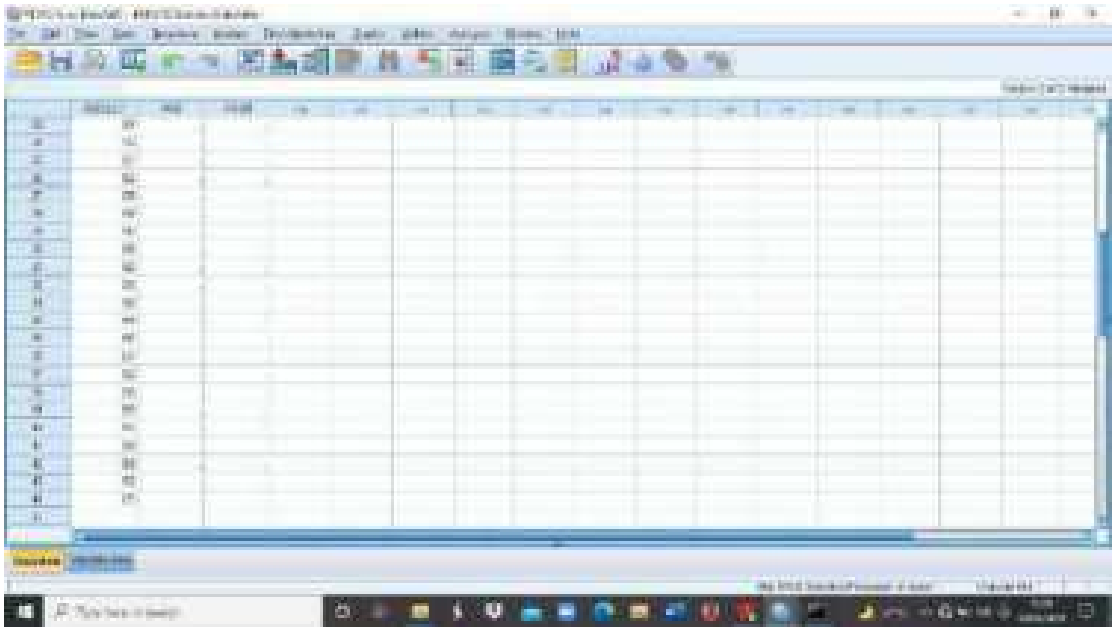


3. Copy and paste the data PRE TEST TO data view in RESULT



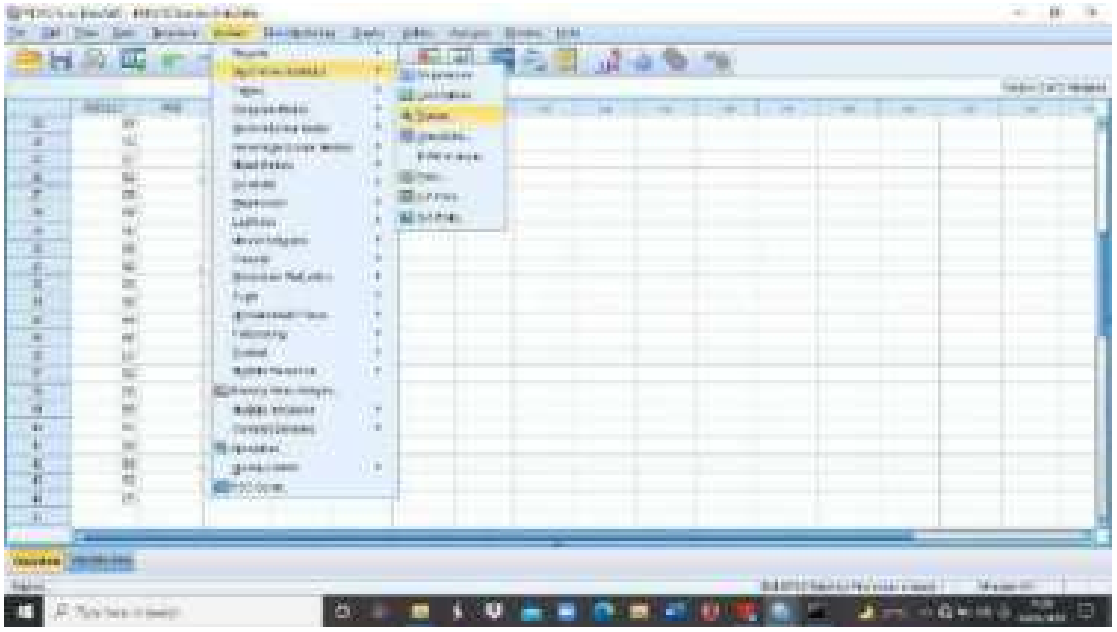
4. Go back to excel copy and paste the post test result

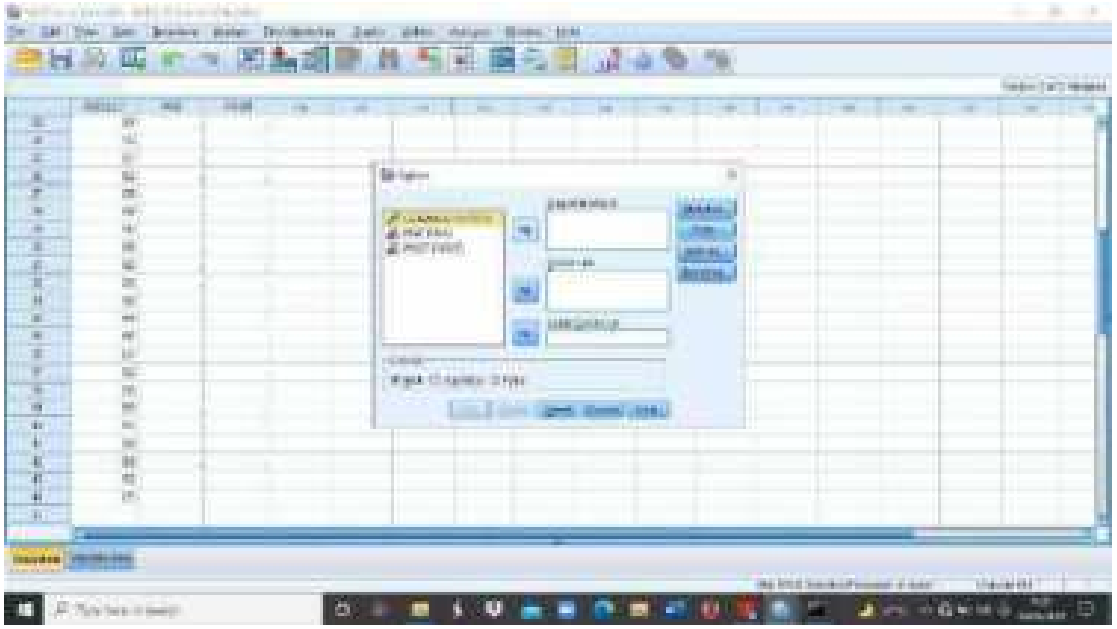




Check the normality test

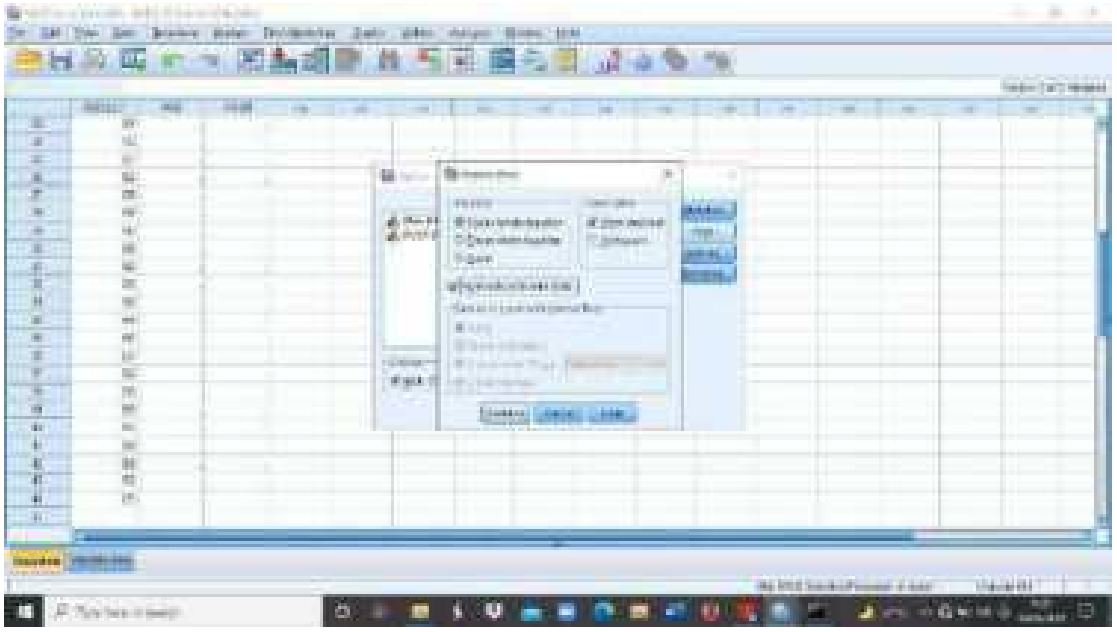
5. Go to the spss -anaylize -descriptive statistic - explore





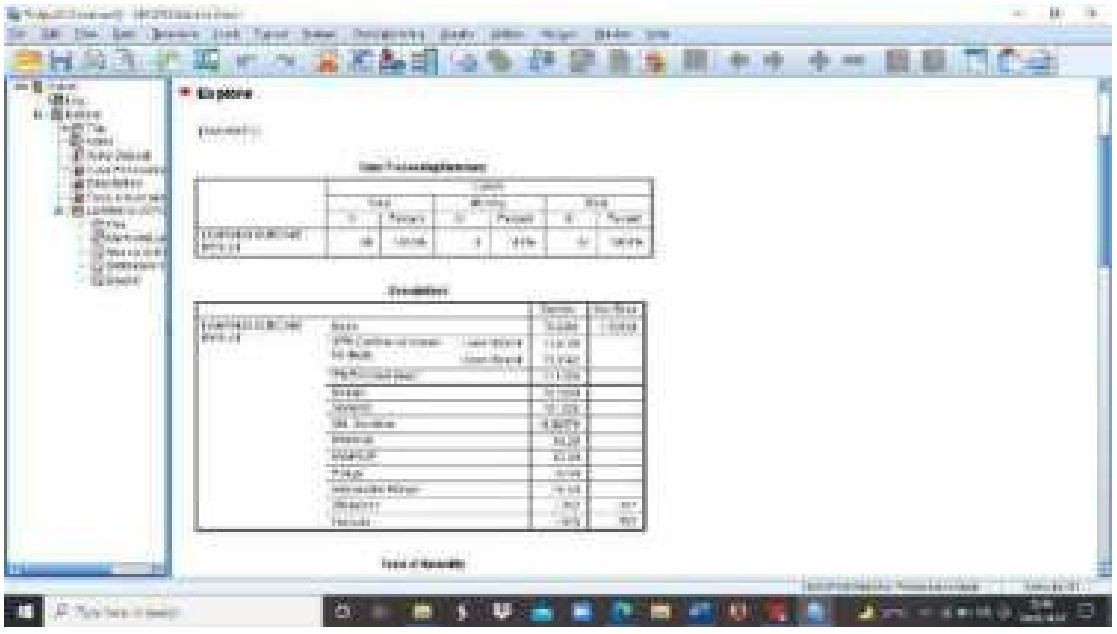
Click dependent list box.

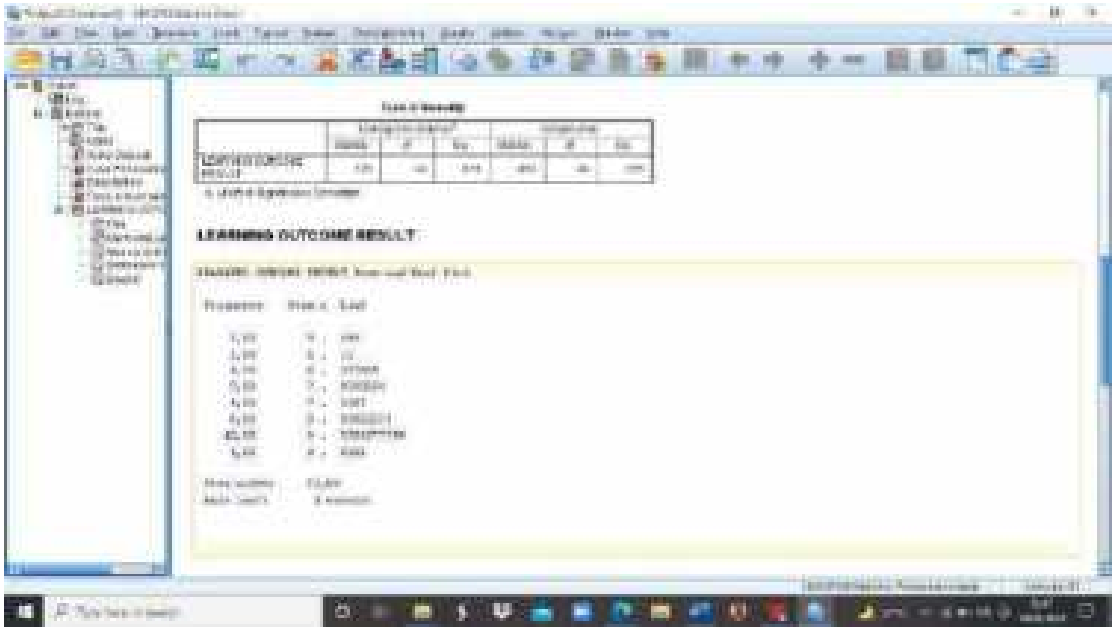
Click plots , click normality test -continue -OK



There are 3 OUTPUTS

1. case processing summary
2. Descriptive
3. Test of Normality





The significance of the data use Shapiro wilk

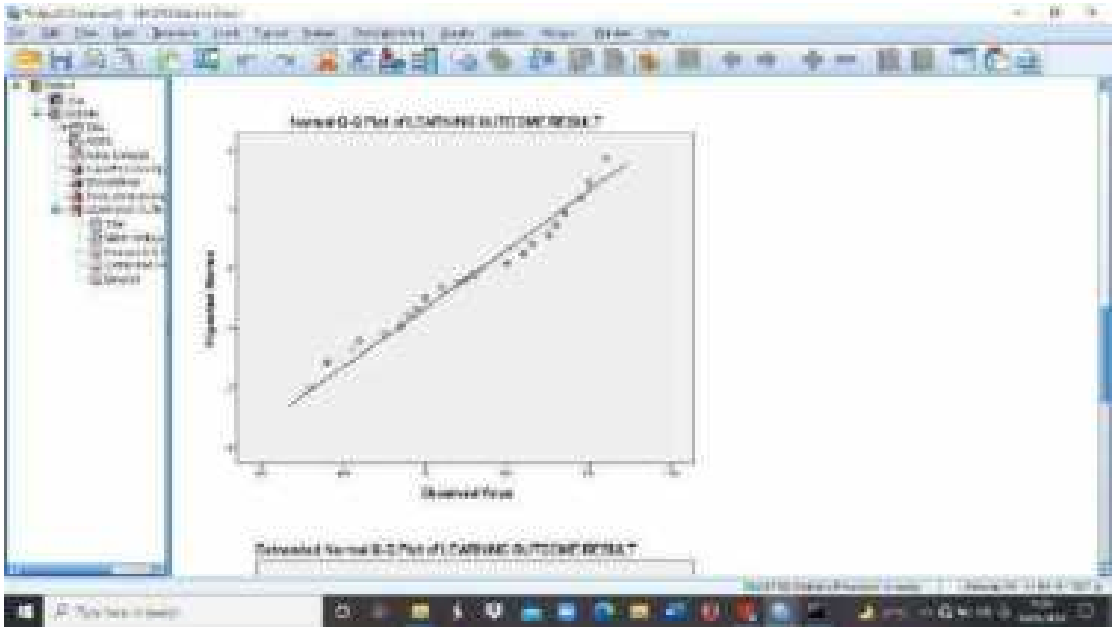
Decision based on normality test

If the sig. Value >0,05 ,the data distribute normally.

If the value of sig <0,05 ,then the data do not distribute normally

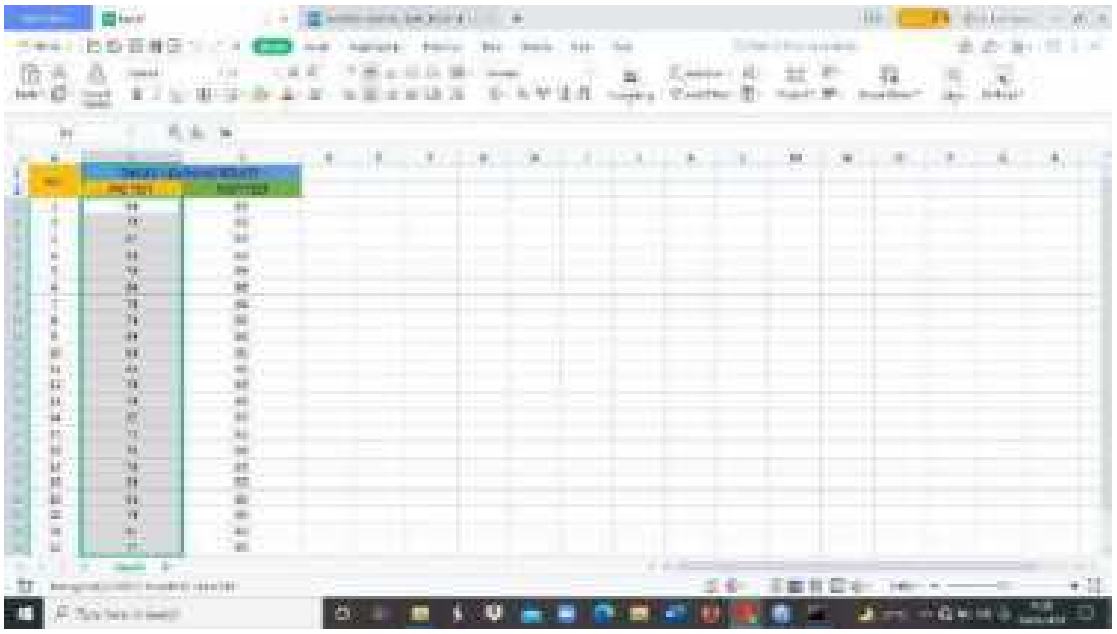
If the data distribute normally ,go to paired sample test

The data is normal

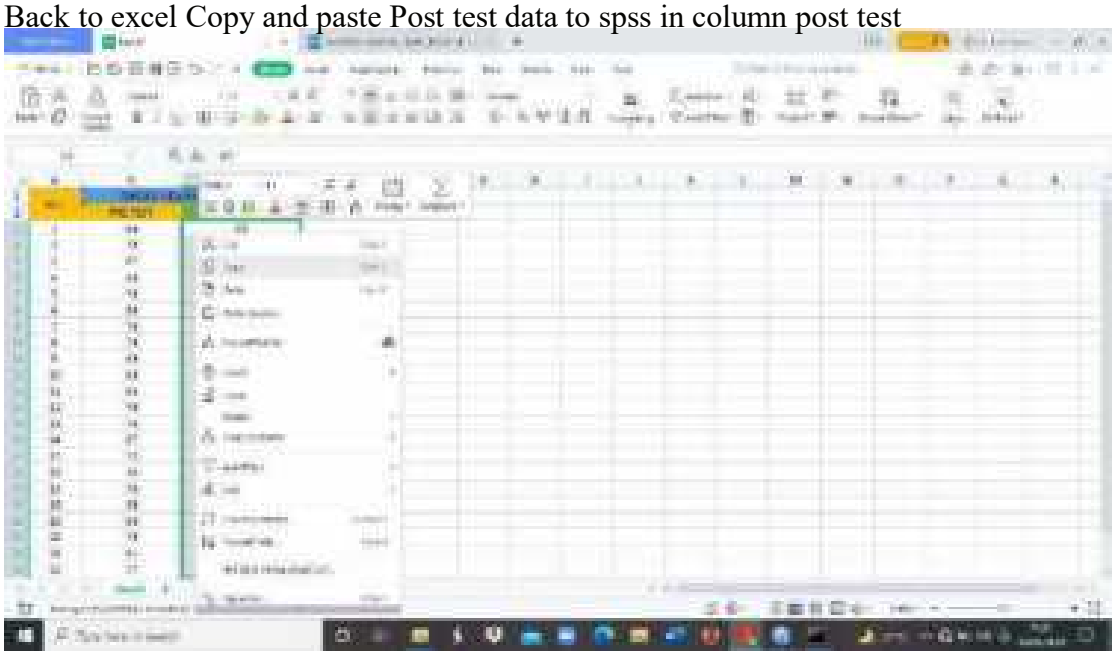


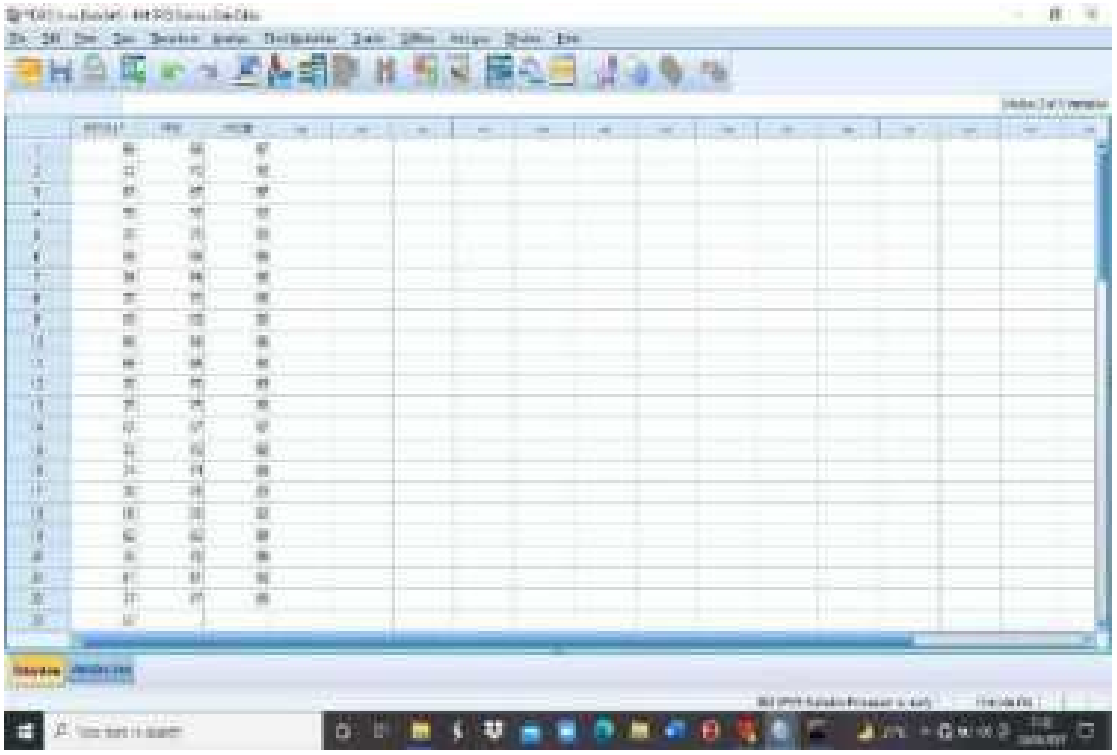
After the result data is normally ,so go to Paired sample t test

Go to excel copy paste the data PRE TEST TO SPSS In column Pre Test

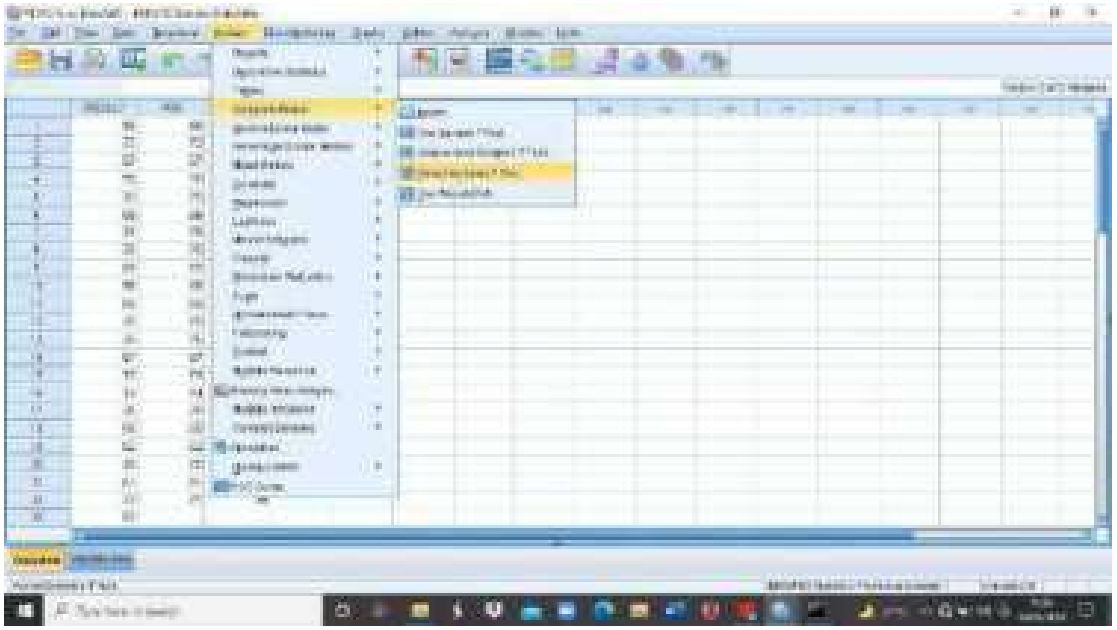


Back to excel Copy and paste Post test data to spss in column post test





Paired sample t test in SPSS
Go to analyze -click- COMPARE means -Paired sample t test

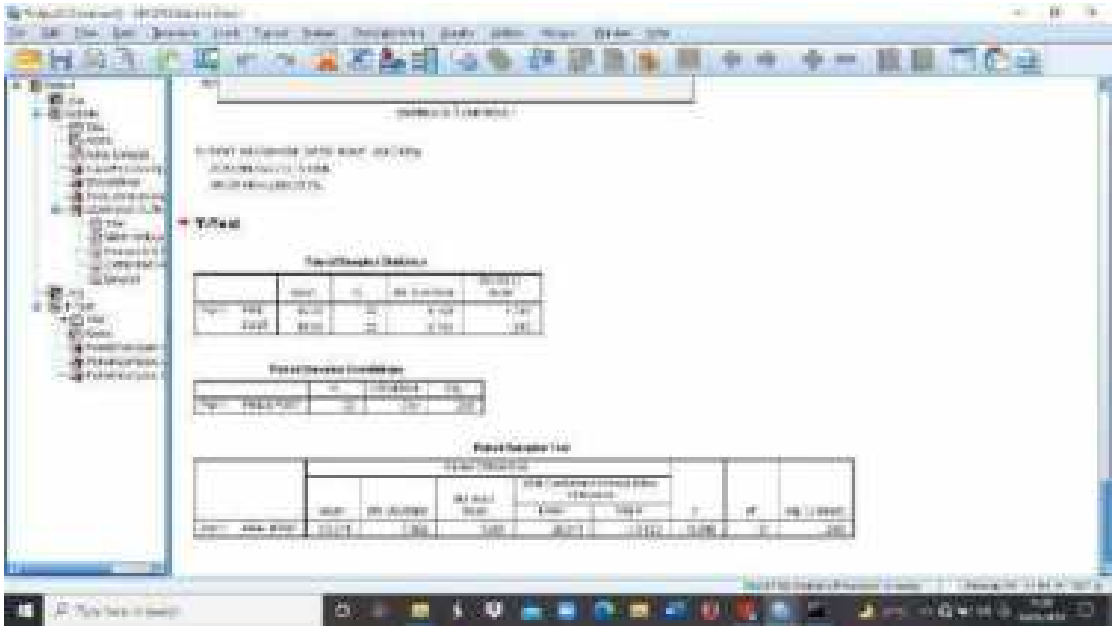


Send the box pre test to variable 1 click the box

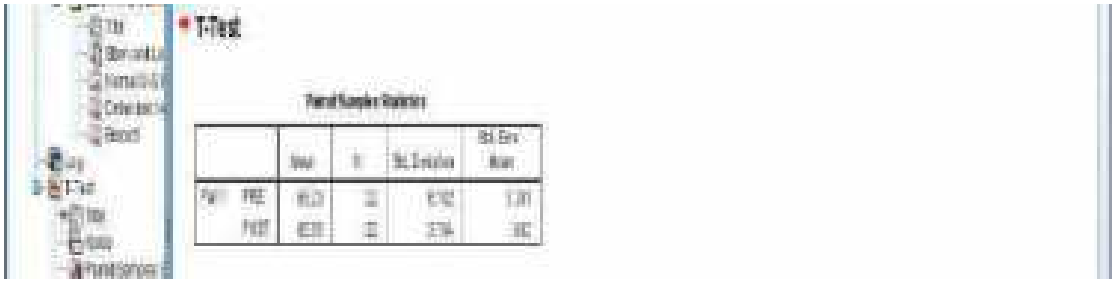
Send the box Post test to variable 2 click the box -click option make sure the percentage is 95 % and then click continue.

The result of paired sample t test 3 OUTPUTS :

1. Paired sample statistics
2. Paired sample correlations
3. Paired samples test

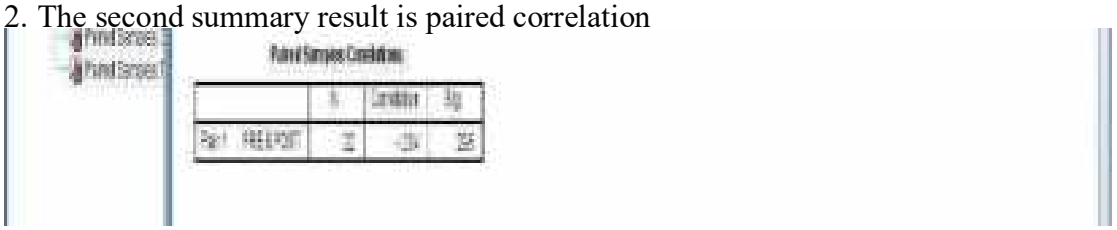


SPSS Output interpretation
First output



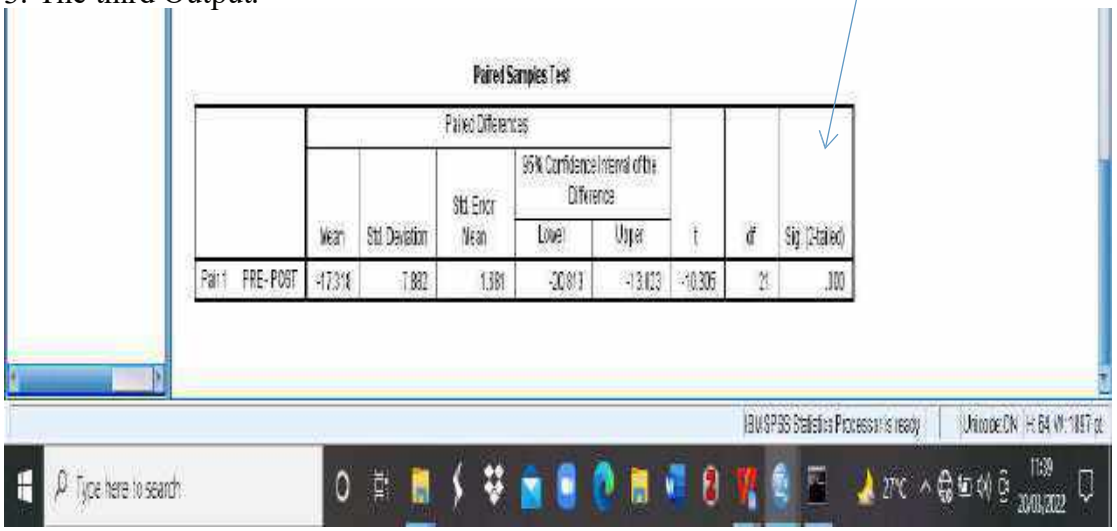
The output shows the summary result from descriptive statistic from both samples or pre test and post test data.

2. The second summary result is paired correlation



the second output explain whether there in correlation between pre test and post test There is significance 0,295 >0,05.it means that there is no relation between pre test and post test.

3. The third Output.



Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PRE-POST	-17.316	7.882	1.381	-20.813	-13.823	-10.305	21	.000

Decision making paired sample t test
1. If the value of sig.(2-ttailed)< 0,05 ,then there is a significant difference between learning outcomes in pre test and post test data.
2. If the value of sig (2-tailed)>0,05 , then there is no significant difference between learning outcomes in pre test and post test

Conclusion
It is known that the value of sig (2-tailed) is 0,000 <0,05 so we can conclude that there is significant difference between pre test and post test
Through the cooperative learning method with TGT Type .It can Improve the learning english outcome.

The result of paired sample t test shows there is significance between the results of learning english in pre test and post test.

10. INDEPENDENT SAMPLE T-TEST WITH SPSS

BASIC CONCEPTS OF INDEPENDENT SAMPLE T-TEST

- The test in Independent sample t test is used to determine whether there is a difference in the mean of two unpaired samples.
- Terms of parametric statistical test: Normal and Homogeneous (Allen, 2017; Everitt & Skrondal, 2006; Field, 2005; Garth, 2008; Gerald, 2018; Jackson, 2009; Wagner, 2015).

INDEPENDEPENT SAMPLE t TEST EXAMPLE

- A researcher made a conjecture stating that "there is significant difference between the result of student English learning outcomes in Class A and Class B".
- To prove this, the researcher chose randomly 22 students in Class B and 22 students in Class B.
- The result of the learning outcomes of the 22 students in Class A and 22 students in Class B is as follows. (go to excel data)

RESEARCH DATA ANALYSIS WITH SPSS

- Conduct a normality test to find out whether the average result of student English learning outcomes is normally distributed or not as a requirement for Independent sample t test in Parametric Statistics.
- Conduct homogeneity test. If the data is homogeneous, the Independent sample t test can be conducted.
- Perform Independent sample t test.
- ANALYSIS STAGE
  INPUT -->ANALYSIS -->OUTPUT
  (open SPSS 21 for inputting data from excel, do normality test)

DECISION BASED ON NORMALITY TEST

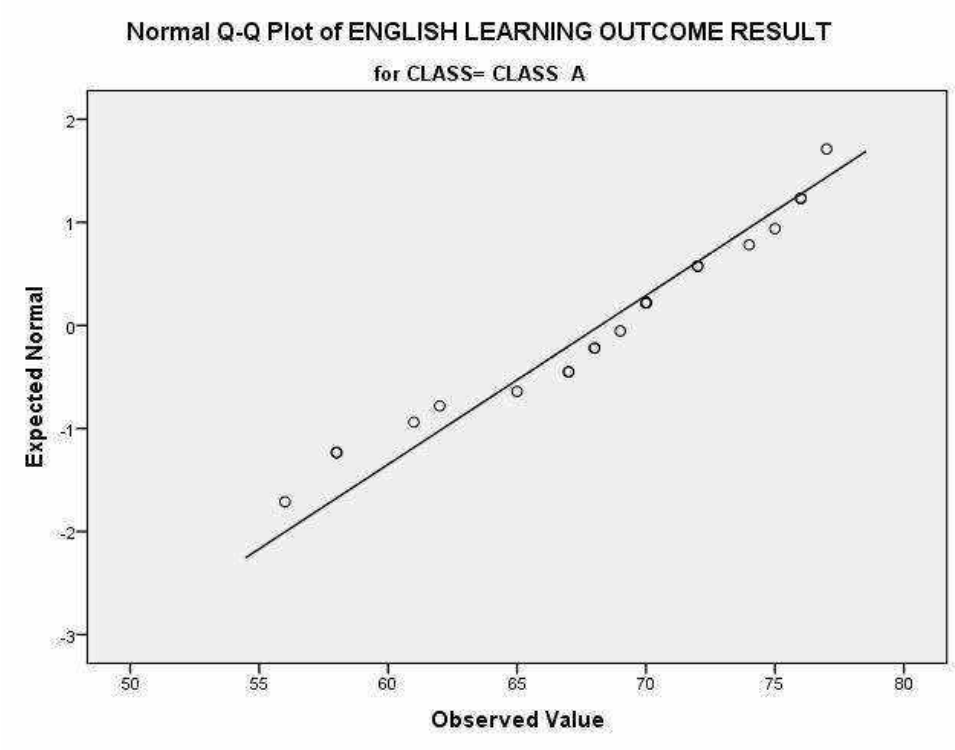
If the sig. value > 0.05, the data distribute normally.
If the value of sig. < 0.05, then the data do not distribute normally.
If the data distribute normally, go to Independent sample t test.

Tests of Normality

	CLASS	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statist	df	Sig.	Statist	df	Sig.
ENGLISH LEARNING OUTCOME RESULT	CLASS A						
	CLASS B						

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction



HOMOGENITY TEST WITH SPSS

BASIC CONCEPTS

Homogeneity test is a test of whether or not the variance of two or more distributions is equal. Homogeneity test is usually used as a requirement in the analysis of the Independent t test and ANOVA.

Decision-Making Basis

- If the significant value is > 0.05 then the data distribution is homogeneous.
- If the significant value is < 0.05 then the data distribution is not homogeneous.

Test of Homogeneity of Variance

		Levene Statis	df1	df2	Sig.
ENGLISH LEARNING OUTCOME RESULT	Based on Mean				
	Based on Median				
	Based on Median and with adjusted df			3	
	Based on trimmed mean				

BASIC DECISION MAKING OF INDEPENDENT T TEST
1. If the value of Sig. (2-tailed) < 0.05, then there is a significant difference between learning outcomes in CLASS A and CLASS B.
2. If the value of Sig. (2-tailed) > 0.05, then there is no significant difference between learning outcomes in CLASS A and CLASS B.

SPSS OUTPUT INTERPRETATION
FIRST OUTPUT

Group Statistics

	CLASS	N	Mean	Std. Deviation	Std. Error Mea
ENGLISH LEARNING OUTCO	CLASS A		68	6.	1.
RESULT	CLASS B		85	3.	.

This output shows the summary results of descriptive statistics from both samples or class A and class B data. (Mean, N, Std. Deviation, Std. Error Mean that explain statistics descriptive)

SECOND OUTPUT

BASIC DECISION MAKING FOR INDEPENDENT SAMPLE T TEST
1. If the value of Sig. (2-tailed) < 0.05, then there is a significant difference between

Independent Samples Test

		Levene's Test Equality of Vari		t-test for Equality of Means						
		F	Sig	t	d	Sig. taile	Mea Differe	Std. E Differe	95% Confider Interval of th Difference	
									Low	Upp
ENGLISH LEARNING OUTCOME RESULT	Equal variance assumed			-1			-17.	1.	-20.	-14.
	Equal variance assumed			-1	3		-17.	1.	-20.	-14.

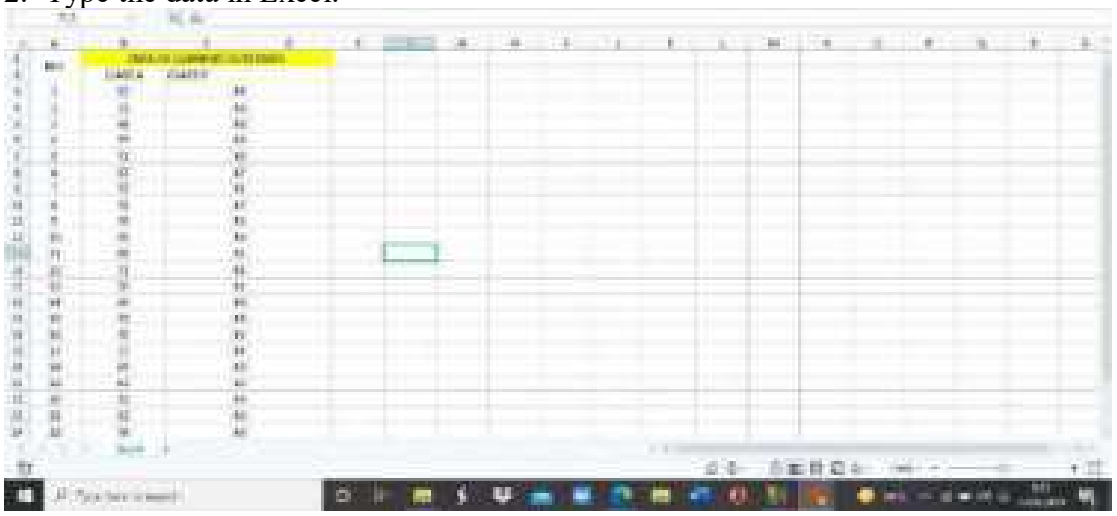
English learning outcomes in Class A and Class B.
2. If the value of Sig. (2-tailed) > 0.05, then there is no significant difference between English learning outcomes in Class A and Class B data.
DECISION-MAKING

It is known that the value of Sig. (2-tailed) is 0.000 < 0.05, so we can conclude that there is a significant difference between the results of learning English in the Class A and Class B data.
Thus, the result of Independent sample t tests shows there is a significance difference between the results of learning English in the Class A and Class B scores.
The other ways can be done to detect the significance difference through the comparison of tcount and ttable. But significance 2 tailed is effective and accurate enough to find whether there is significance difference or not.

10. INDEPENDENT SAMPLET TEST
SPSS TUTORIAL & PRACTICE

INDEPENDENT SAMPLE T TEST - NORMALITY TEST & HOMOGENITY TEST.SIGNIFICANCE 0,05.

1. INSTALL SPSS
2. Type the data in Excel.

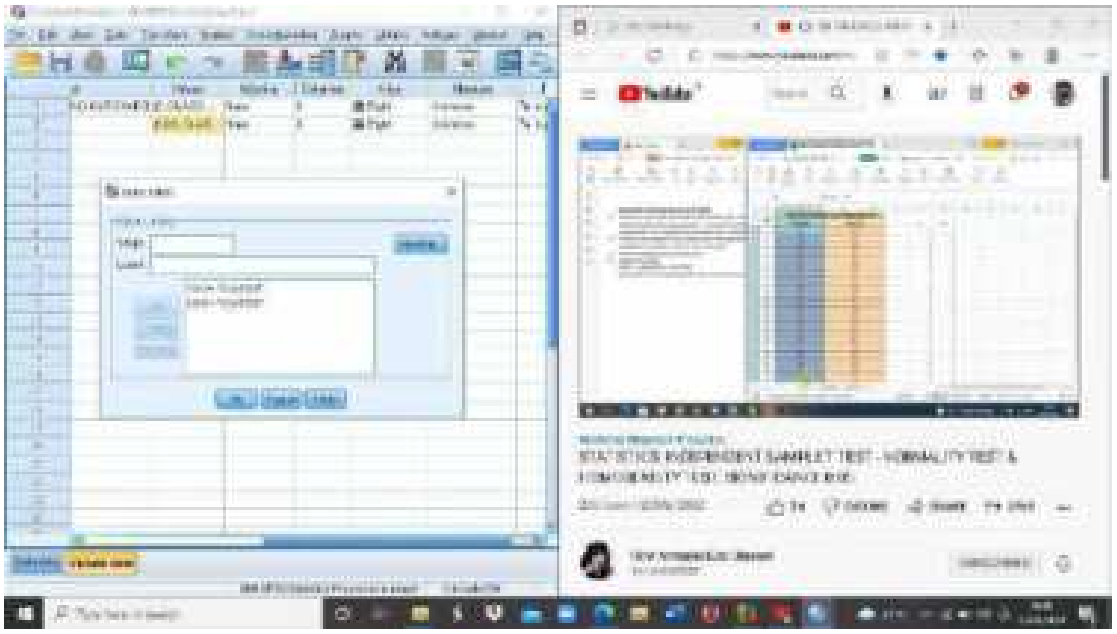


4. Basic concept of Independent sample t test
-The test in independent sample t test is used to determine whether there is a difference in the mean of two unpaired samples.
-Terms of parametric statistical test :Normal and Homogeneous.

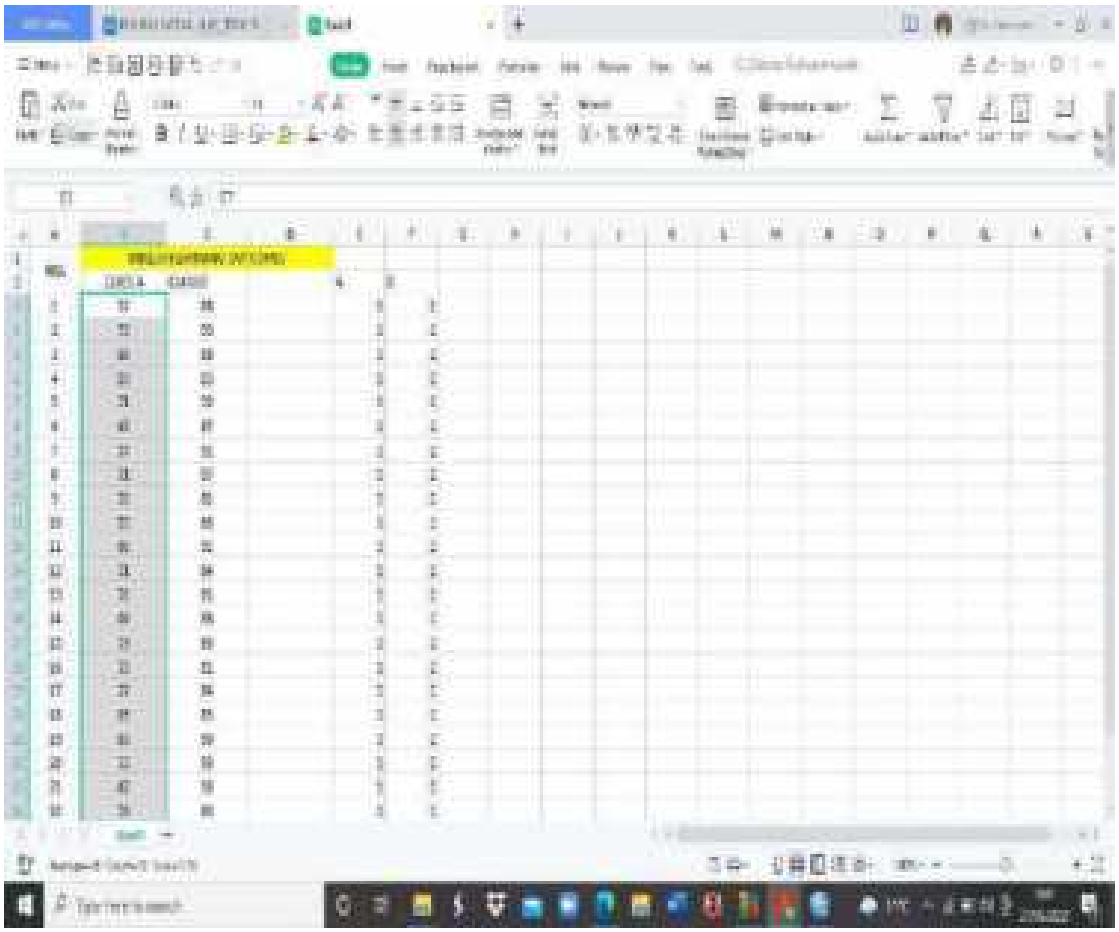
STEPS

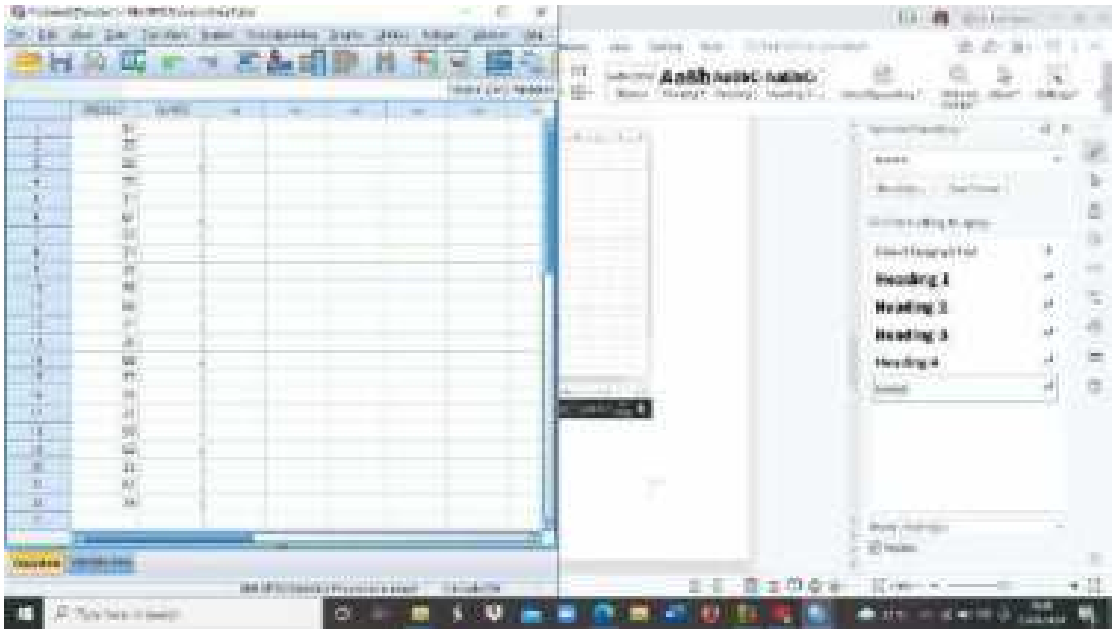
1. Conduct a normality test to find out whether the average result of student English learning outcomes is normally distributed or not as a requirements for independent samplet test in Parametric Statistics.
2. Conduct homogeneity test , if the data homogeneous ,the independent sample t test can be conducted.
3. Perform independent sample t test.
4. ANALYSIS STAGE

INPUT- ANALYSIS -OUTPUT.

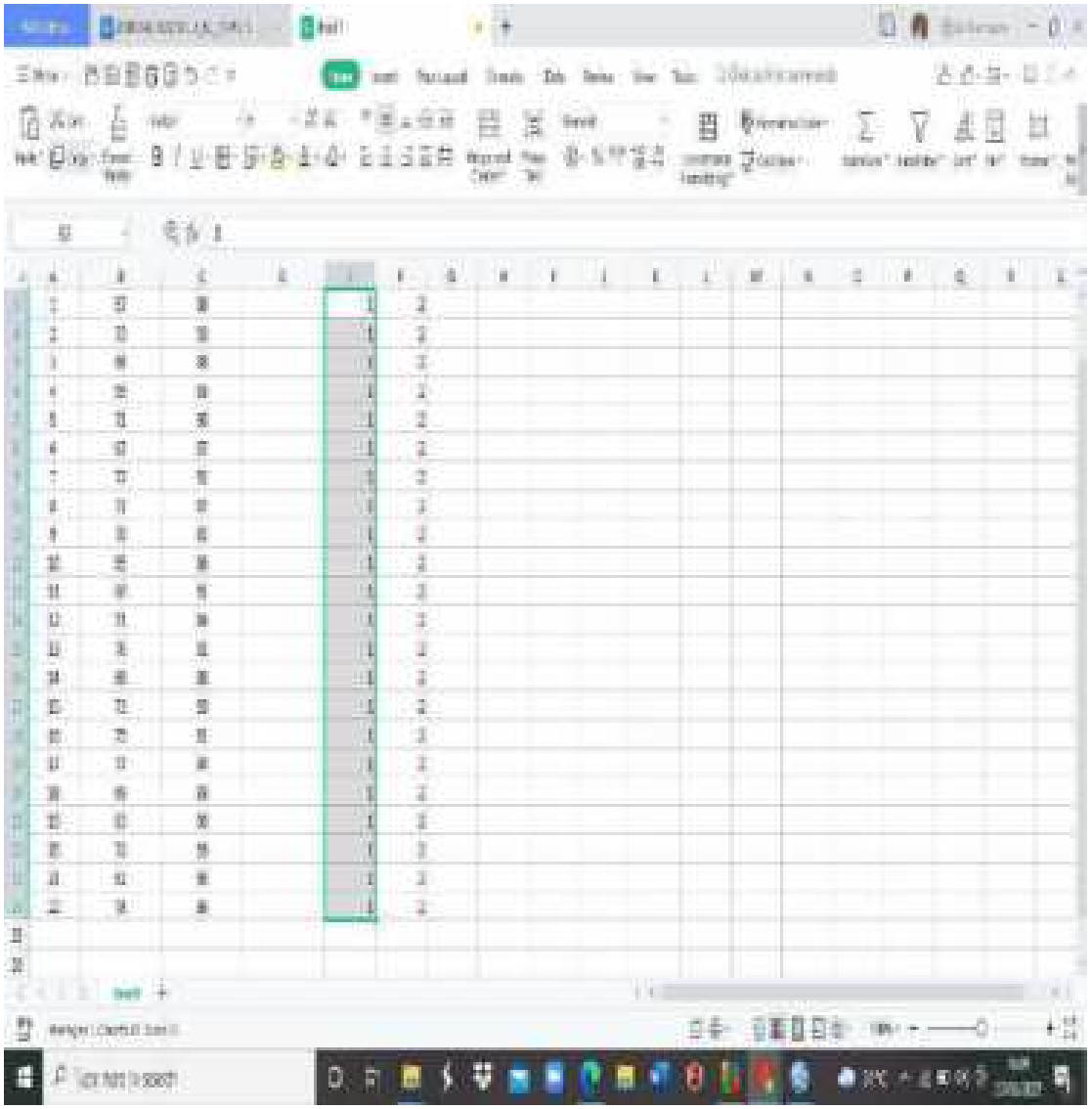


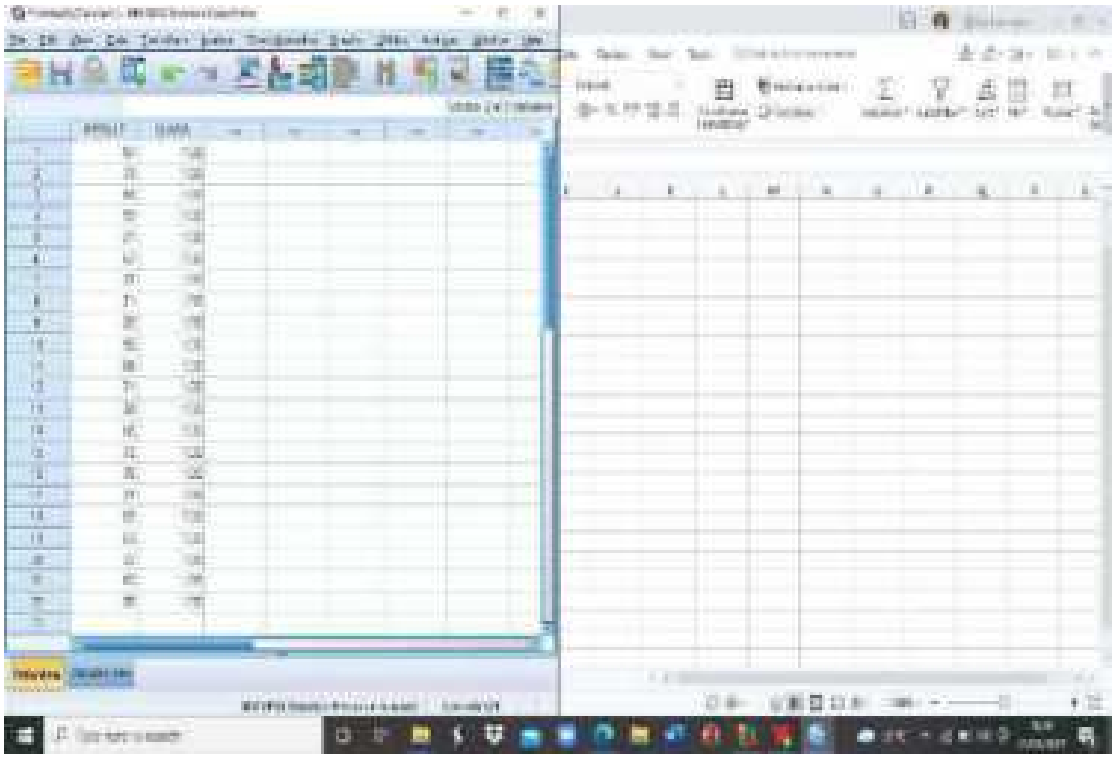
COPY THE data excel Class A to SPSS



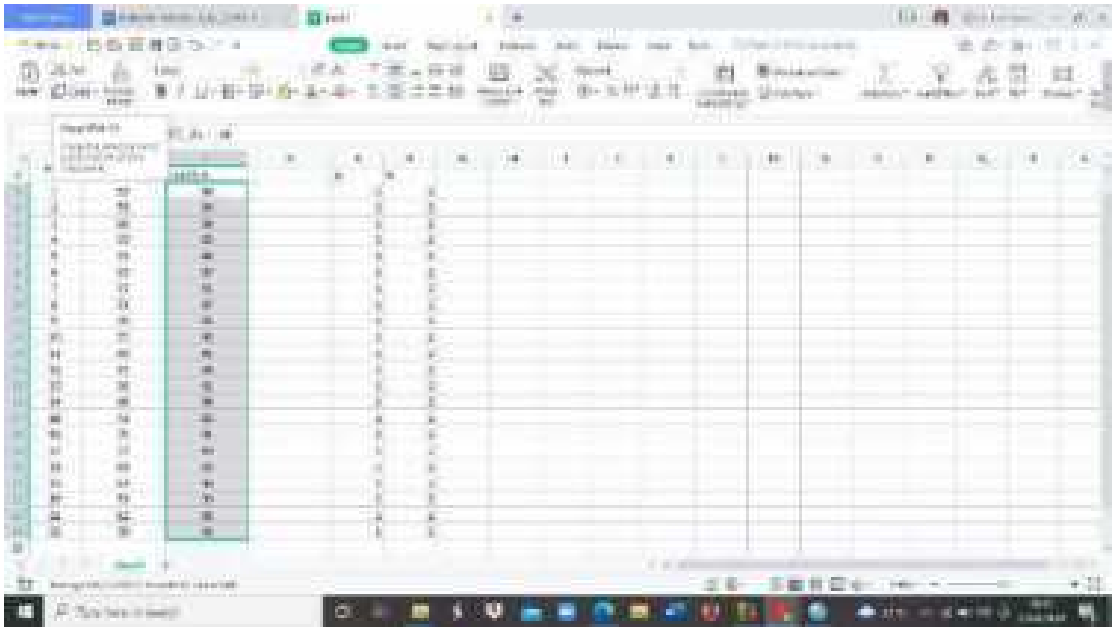


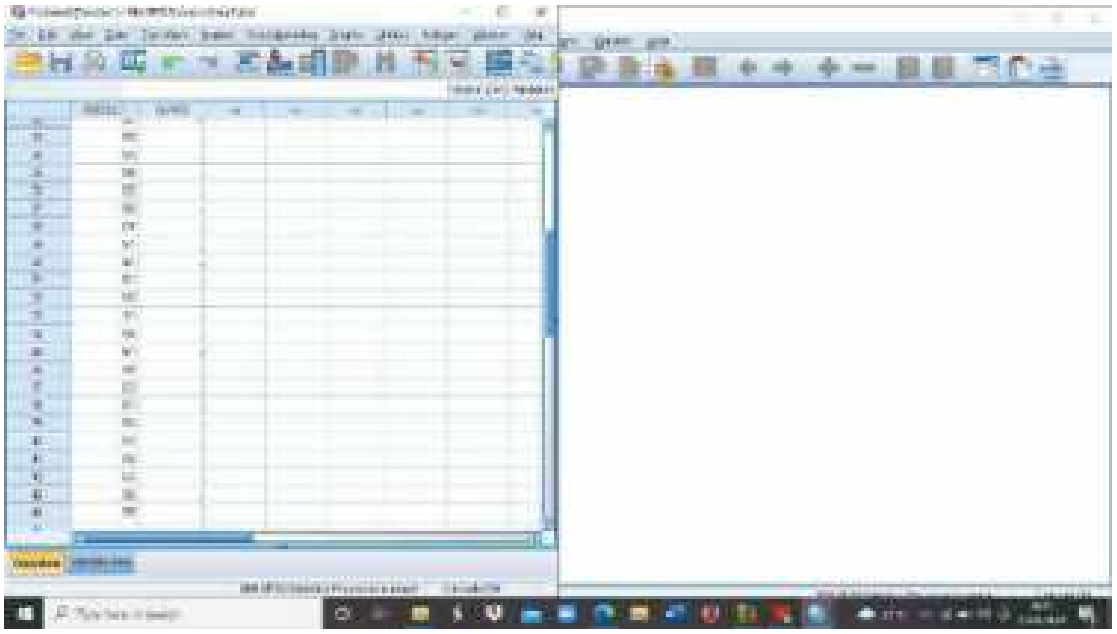
COPY THE DATA of class to SPSS

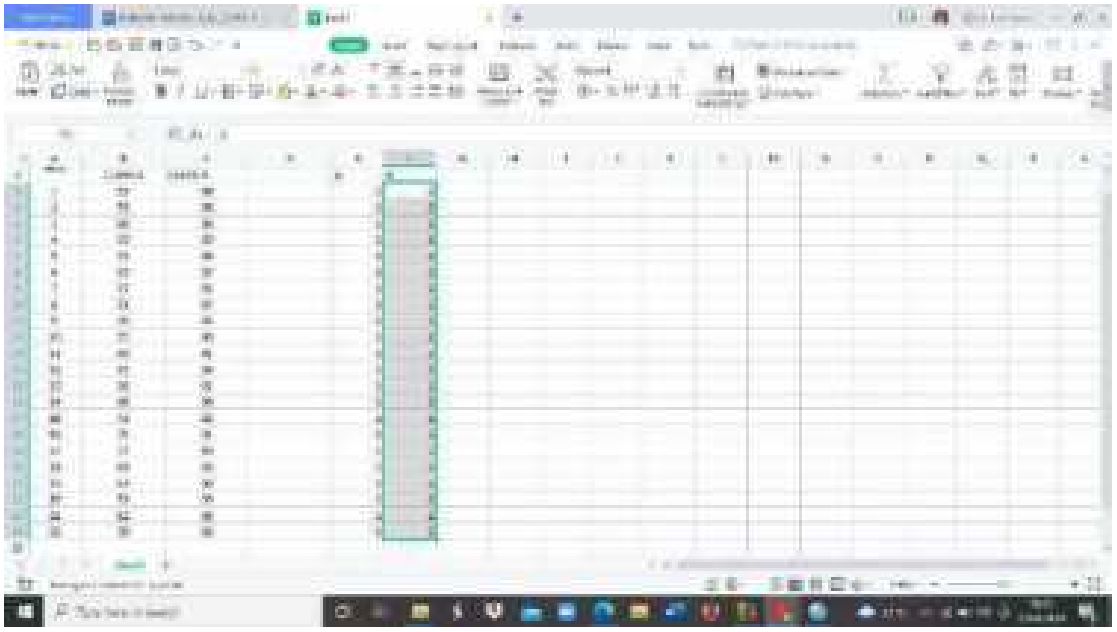


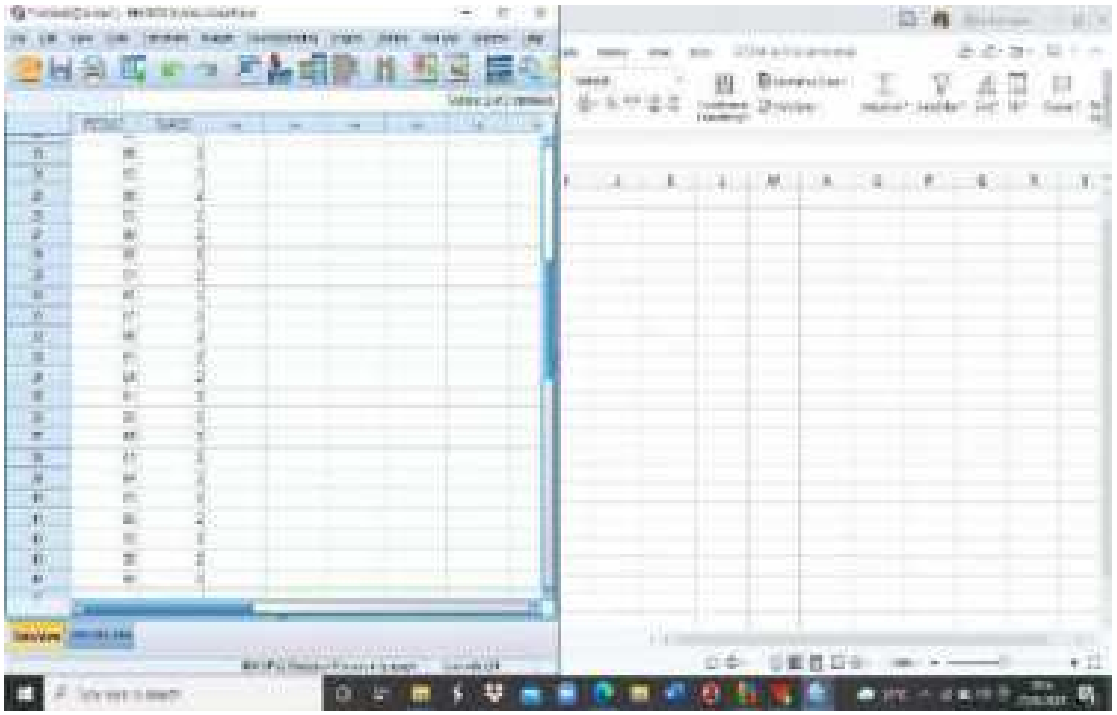


And then go to data excel score class b copy and paste to SPSS





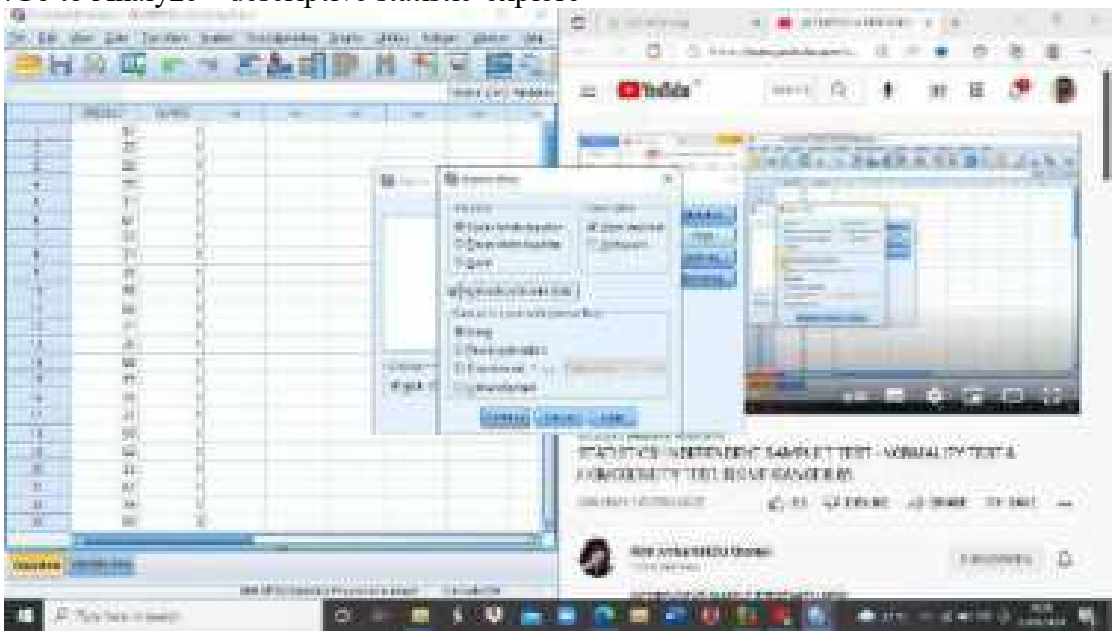




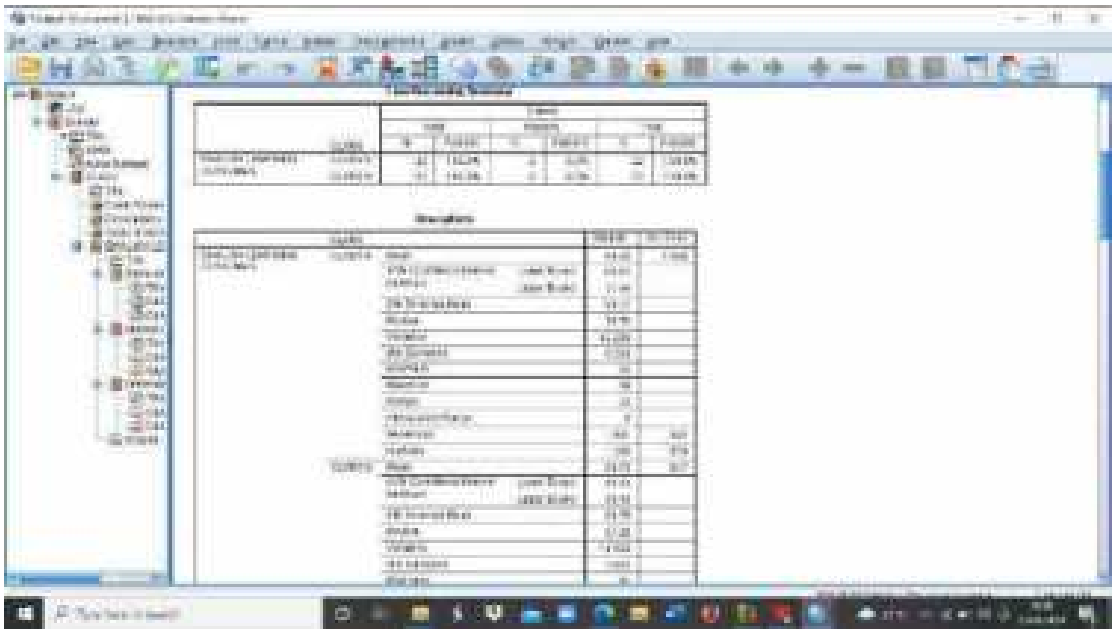
Decision based on normality test

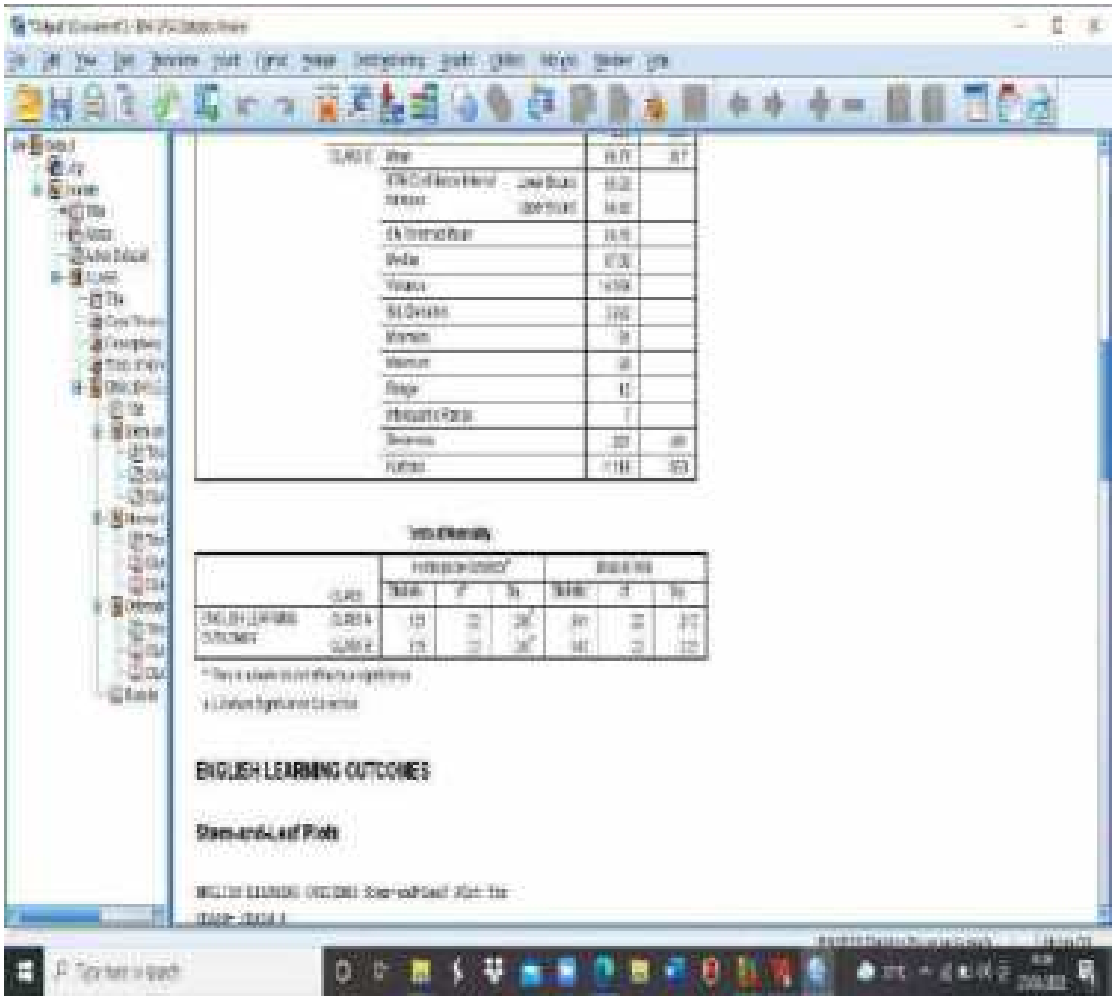
If the sig. Value > 0,05 ,the data distribute normally
If the value of sig < 0,05 ,then the data do not distribute
If the data distribute normally , go to independent statistic.

.Go to Analyze --descriptive statistic-explore



There are 3 outcomes.

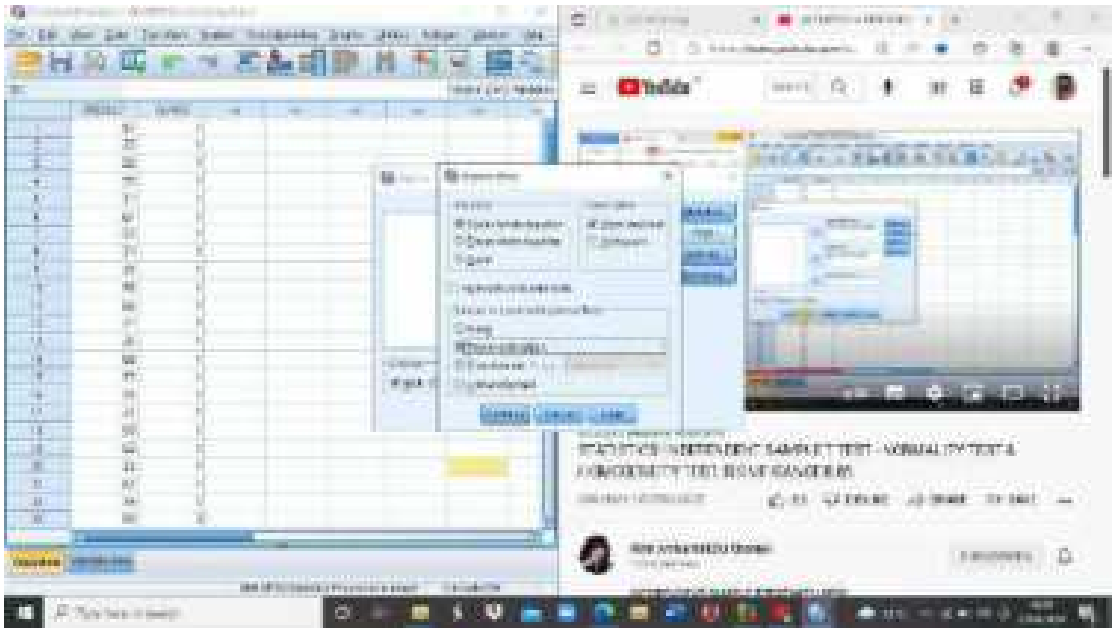


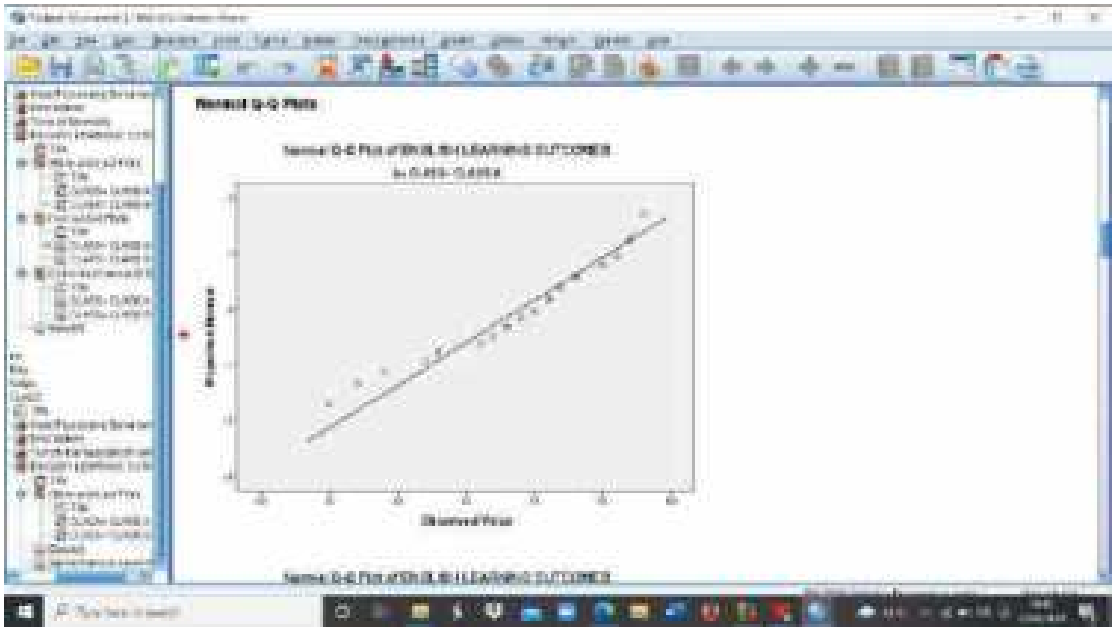


Class A and Class B can distribute normally.

Homogenity test

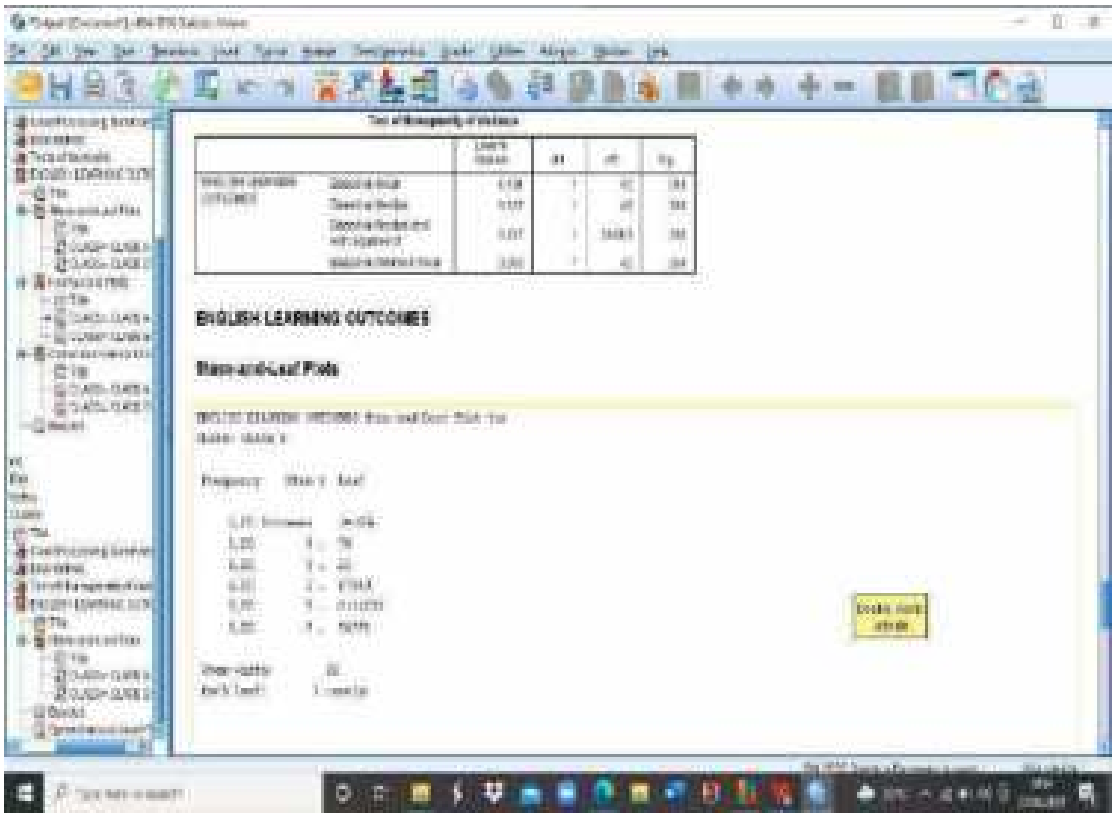
Analyze- descriptive statistic- Explore





Homogenity Test
Decision -Making Basic

-If the significant value is > 0,05 then, the data distribution is homogeneous
If the significant value is < o,05 then the data distribution is not homogeneous.



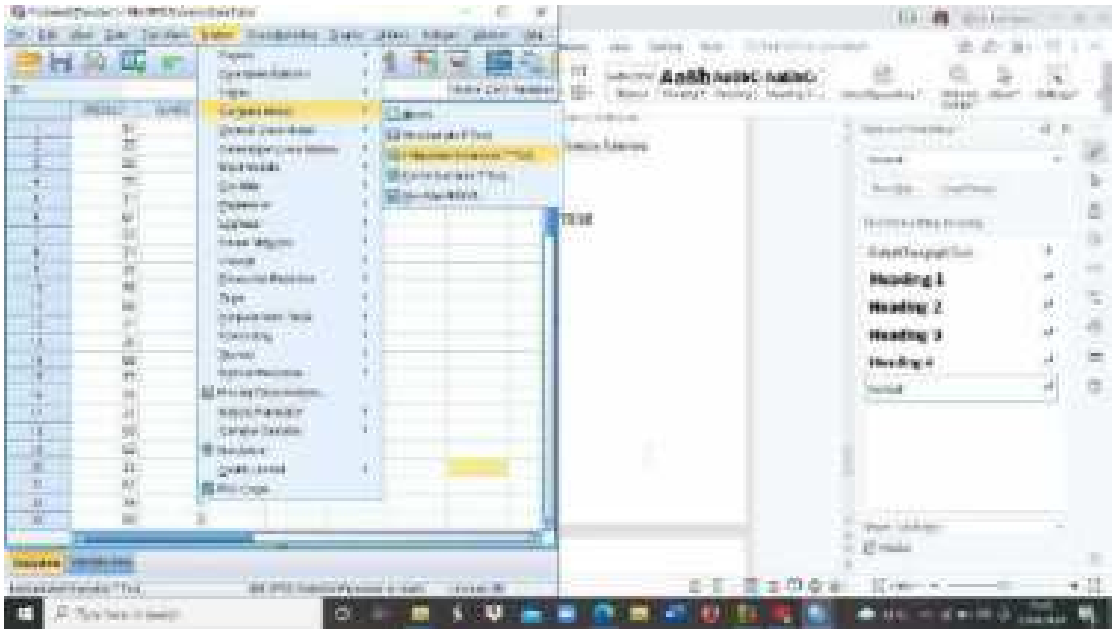
Next step Go to Independent t test

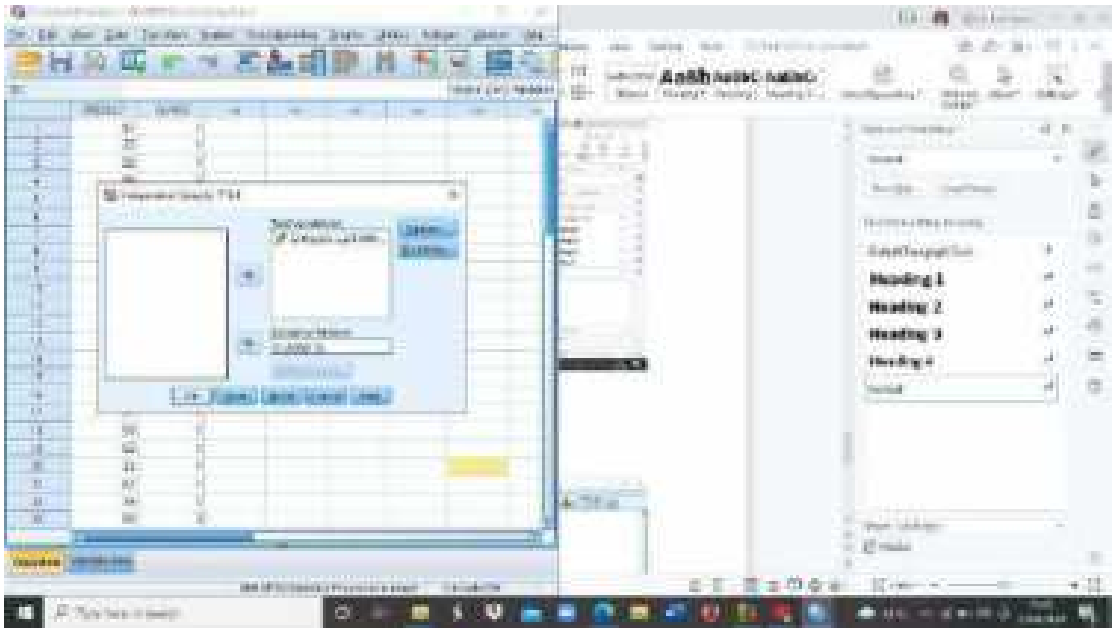
Basic decision making of independent t test

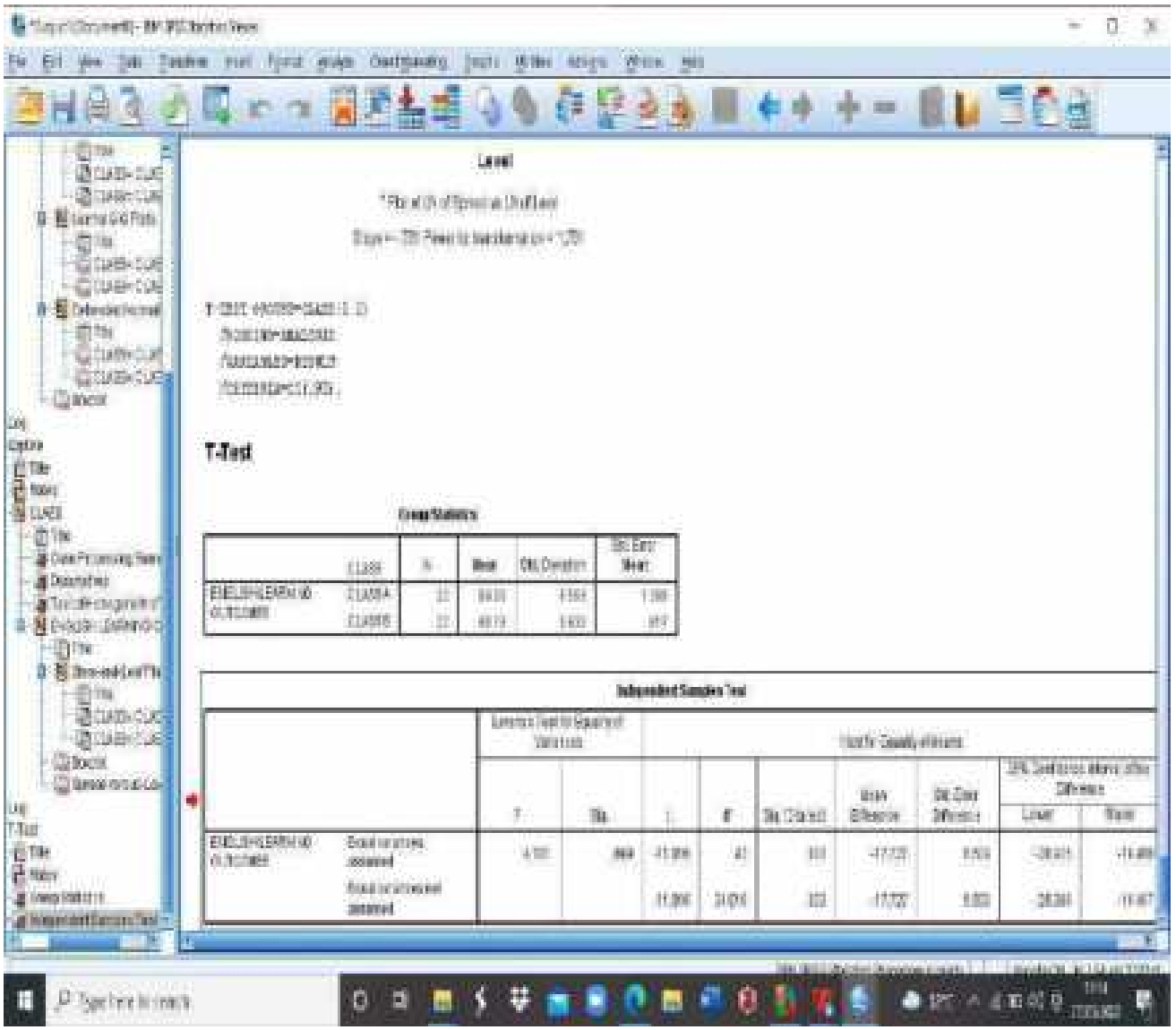
1. If the value of sig. (2 tailed)< 0,05 ,then there is a significant difference between learning outcomes in CLASS A and CLASS B.
2. If the value of sig. (2 tailed)> 0,05 ,them there is no significant difference between learning outcomes in CLASS A and CLASS B.

Go to SPSS TO

ANALYZE - COMPARE MEAN - INDEPENDENT SAMPLE T TEST







Decision making

It is known that the value of sig. (2 -tailed) is 0,000 < 0,05.so, It can conclude That there is significant difference between the result of learning English in the class A class B scores.

The other ways can be done to detect the significance through the comparison of t count and t table

But the significance 2 tailed is effective and accurate enough to find whether there is significance difference or not.

11. DATA ANALYSIS OF EXPERIMENT AND CONTROL CLASS FOR THESIS WITH SPSS [GUIDE 1 OF 5]

BASIC CONCEPTS OF RESEARCH (Thesis)

Thesis title:

The Effect of Problem Based Learning (PBL) Learning Model on Student Learning Outcomes in English Subjects "Genre Texts" Material.

Formulation of the problem

1. To what extent does the Problem Based Learning (PBL) model affect student learning outcomes in English Subjects "Genre Texts" Material?
2. Is there any difference in student learning outcomes in English Subjects "Genre Texts" Material between problem based learning (PBL) and conventional learning models?

Research methods

1. The research design used a quasi-experimental.
2. Collecting data using tests (Pre-test and Post-test in the experimental class and control class).
3. The experimental class applies the PBL learning model while the control class applies the conventional learning model.

Research Data Analysis

1. Descriptive Analysis
2. Normality Test
3. Paired Sample t Test (if the data is normal)
4. Wilcoxon test (if the data is not normal)
5. Homogeneity Test
6. Test Independent Sample t Test (if the data is normal)
7. Mann Whitney test (if the data is not normal)

Basic Concepts of Descriptive Analysis

Descriptive statistical analysis is useful for describing and describe research data, including the amount of data, maximum score, minimum score, average score, and so on (Ave, 1999; Everitt & Skrondal, 2006; Field, 2005; Friedrich et al., 2017; Garth, 2008; Jackson, 2009; Sharma, 2017; Singh, Kumar, 2006).

Results of Descriptive Analysis with SPSS

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test Experiment	22	57	78	68.77	6.332
Post-Test Experiment	22	81	93	86.55	3.582
Pre-Test Control	22	56	85	68.55	7.915
Post-Test Control	22	68	90	78.55	5.369
Valid N (listwise)	22				

[GUIDE 2 OF 5] EXPERIMENT & CONTROL CLASS DATA ANALYSIS FOR THESIS WITH SPSS

RESEARCH DATA ANALYSIS
1. Descriptive Analysis (√)
2. Normality Test
3. Paired Sample t Test (if the data is normal)
4. Wilcoxon test (if the data is not normal)
5. Homogeneity Test
6. Test Independent Sample t Test (if the data is normal)
7. Mann Whitney test (if the data is not normal)

THE BASIC CONCEPTS OF THE NORMALITY TEST

1. The normality test was conducted to determine whether the research data were normally distributed or not.
2. Normal data is an absolute requirement before we perform parametric statistical analysis (paired sample t test and independent sample t test).
3. In parametric statistics, there are 2 kinds of normality tests that are often used, namely the Kolmogorov-Smirnov test and the Shapiro-Wilk test.

NORMALITY TEST RESULTS WITH SPSS

Tests of Normality

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning Outcome Result	Pre-Test Experiment (PBL)	.133	22	.200*	.945	22	.250
	Post Test Experiment (PBL)	.121	22	.200*	.948	22	.291
	Pre-test Control (Conventional)	.109	22	.200*	.965	22	.591
	Post Test Control (Conventional)	.166	22	.118	.955	22	.396

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

NORMALITY TEST INTERPRETATION

1. Based on the output above, it is known that the significance value (Sig.) for all data both on the Kolmogorov-Smirnov test and the Shapiro-wilk test > 0.05, it can be concluded that the research data is normally distributed.
2. Because the research data are normally distributed, we can using parametric statistics (paired sample t test and test independent sample t test) to analyze research data.

[GUIDE 3 OF 5] EXPERIMENT & CONTROL CLASS DATA ANALYSIS FOR THESIS WITH SPSS

RESEARCH DATA ANALYSIS

1. Descriptive Analysis (√)
2. Normality Test (√)
3. Paired Sample t Test (if the data is normal)
4. ~~Wilcoxon test (if the data is not normal)~~
5. Homogeneity Test
6. Test Independent Sample t Test (if the data is normal)
7. ~~Mann Whitney test (if the data is not normal)~~

PAIRED SAMPLE T TEST BASIC CONCEPTS

1. The paired sample t test is used to determine whether there is a difference in the mean of two paired samples.
2. The requirements in the paired sample t test are data with normal distribution. (based on the results of the normality test in the previous video concluded that the research data is normally distributed)
3. For homogeneous data variance is not a requirement in the paired sample t test.
4. The paired sample test in this study was used to answer the problem formulation "To What extent does the Problem Based Learning (PBL) model affect student learning outcomes in English Subjects "Genre Texts" Material?
5. To answer the formulation of the problem, the paired sample t test was carried out on the experimental class Pre-test data with the experimental class Post-test (PBL model). Then the control class Pre-test data with the control class Post-test data (Conventional model).

RESULTS OF PAIRED SAMPLE T TEST WITH SPSS

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-Test Experiment - Post-Test Experiment	-17.773	7.764	1.655	-21.215	-14.330	-10.737	21	.000
Pair 2	Pre-Test Control - Post-Test Control	-10.000	5.855	1.248	-12.596	-7.404	-8.010	21	.000

PAIRED SAMPLE T TEST TEST INTERPRETATION

1. Based on the output of Pair 1, the value of Sig. (2-tailed) of 0.000 <0.05, it can be concluded that there is a difference in the average student learning outcomes for the Pre-test experimental class and Post-test experimental class (PBL model).
2. Based on the output of Pair 2, the value of Sig. (2-tailed) of 0.000 <0.05, it can be concluded that there is a difference in the average student learning outcomes for the pre-test control class and the post-test control class (conventional model).

CONCLUSION

Based on the discussion of the output of Pair 1, it can be concluded that there is an effect of the problem based learning (PBL) learning model on student learning outcomes in English Subjects "Genre Texts" Material?

DESCRIPTION STATISTICS RESULTS

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-Test Experiment	68.77	22	6.332	1.350
	Post-Test Experiment	86.55	22	3.582	.764
Pair 2	Pre-Test Control	68.55	22	7.915	1.687
	Post-Test Control	78.55	22	5.369	1.145

SPSS PRACTICE: Open the data “Untitled Descriptive Data.sav”

[GUIDE 4 OF 5] EXPERIMENT & CONTROL CLASS DATA ANALYSIS FOR THESIS WITH SPSS

RESEARCH DATA ANALYSIS

1. Descriptive Analysis (√)
2. Normality Test (√)
3. Paired Sample t Test (if the data is normal) (√)
4. ~~Wilcoxon test (if the data is not normal)~~
5. Homogeneity Test
6. Independent Sample t Test (if the data is normal)
7. ~~Mann Whitney test (if the data is not normal)~~

BASIC CONCEPTS OF HOMOGENITY TEST

1. The homogeneity test aims to determine whether a variance (diversity) of data from two or more groups is homogeneous (same) or heterogeneous (not the same).
2. Homogeneous data is one of the requirements (not an absolute requirement) in independent sample t test.
3. In this study, the homogeneity test was used to determine whether the variance of the experimental class post-test (PBL) and control (conventional) post-test data was homogeneous or not.

HOMOGENITY TEST RESULTS WITH SPSS

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
English Learning Outcome Result	Based on Mean	1.038	1	42	.314
	Based on Median	1.037	1	42	.314
	Based on Median and with adjusted df	1.037	1	32.319	.316
	Based on trimmed mean	1.037	1	42	.314

HOMOGENITY TEST INTERPRETATION

1. Based on the output above, it is known that the significance value (Sig.) Based on Mean is 0.314 > 0.05, so it can be concluded that the variance of the experimental class post-test data and control class post-test data is the same or HOMOGENOUS.
2. Thus, one of the requirements (not absolute) of the independent sample t test has been fulfilled.

[GUIDE 5 OF 5] EXPERIMENTAL & CONTROL CLASS DATA ANALYSIS FOR THESIS WITH SPSS

RESEARCH DATA ANALYSIS

1. Descriptive Analysis (√)
2. Normality Test (√)
3. Paired Sample t Test (if the data is normal) (√)
4. ~~Wilcoxon test (if the data is not normal)~~
5. Homogeneity Test (√)
6. Independent Sample t Test (if the data is normal)
7. ~~Mann Whitney test (if the data is not normal)~~

BASIC CONCEPTS OF INDEPENDENT SAMPLE T TEST

1. Independent sample t-test is used to determine whether there is a difference in the mean of two unpaired samples.
2. The main requirement in the independent sample t-test is that the data is normally distributed and homogeneous (not absolute). From the results of the analysis in the videos, the conclusions obtained are that the data is normally distributed and homogeneous.
3. Independent test sample t-test in this study is used to answer the research question: "Is there any difference in student learning outcomes in English Subjects "Genre Texts" Material between the problem-based learning (PBL) model and the conventional model?"

4. To answer the formulation of the problem, an independent sample t-test was conducted on the experimental class post-test data (PBL model) with the control class post-test data (conventional model).

TEST RESULTS OF INDEPENDENT SAMPLE T TEST WITH SPSS

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
English Learning Outcome Result	Equal variances assumed	1.038	.314	5.813	42	.000	8.000	1.376	5.223	10.777
	Equal variances not assumed			5.813	36.602	.000	8.000	1.376	5.211	10.789

INDEPENDENT SAMPLE T TEST INTERPRETATION

Based on the output above, the value of Sig. (2-tailed) of 0.000 <0.05, it can be concluded that there is a difference in the average student learning outcomes between the problem based learning (PBL) learning model and the conventional model.

DESCRIPTION STATISTICS RESULTS

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
English Learning Outcome Result	Post-test Experiment (PBL)	22	86.55	3.582	.764
	Post-Test Control (Conventional	22	78.55	5.369	1.145

SPSS PRACTICE: Open the data “Untitled Data Homogenitas.sav”

EXPERIMENT & CONTROL CLASS ANALYSIS
STATISTICS PART 1
SPSS TUTORIAL & PRACTICE

EXPERIMENTAL &CONTROL CLASS ANALYSIS :Descriptive Analysis ,Normality test ,Paired Sample t Test For Thesis.

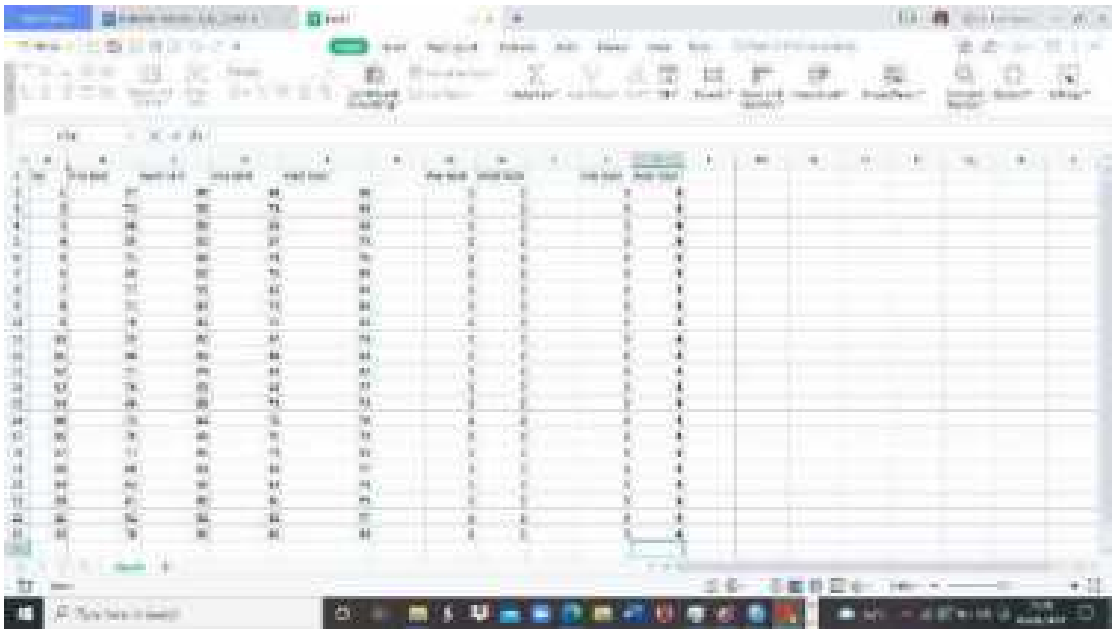
Thesis title
The effect of Problem Based Learning (PBL) Learning model on student learning Outcomes in English Subject '' Genre text '' material.

1. To what extend does the PBL affect student learning outcomes in English Subject ''Genre Text ''
2. Is there any difference in students learning outcomes in English Subject ''Genre text'' material between PBL and Conventional model.

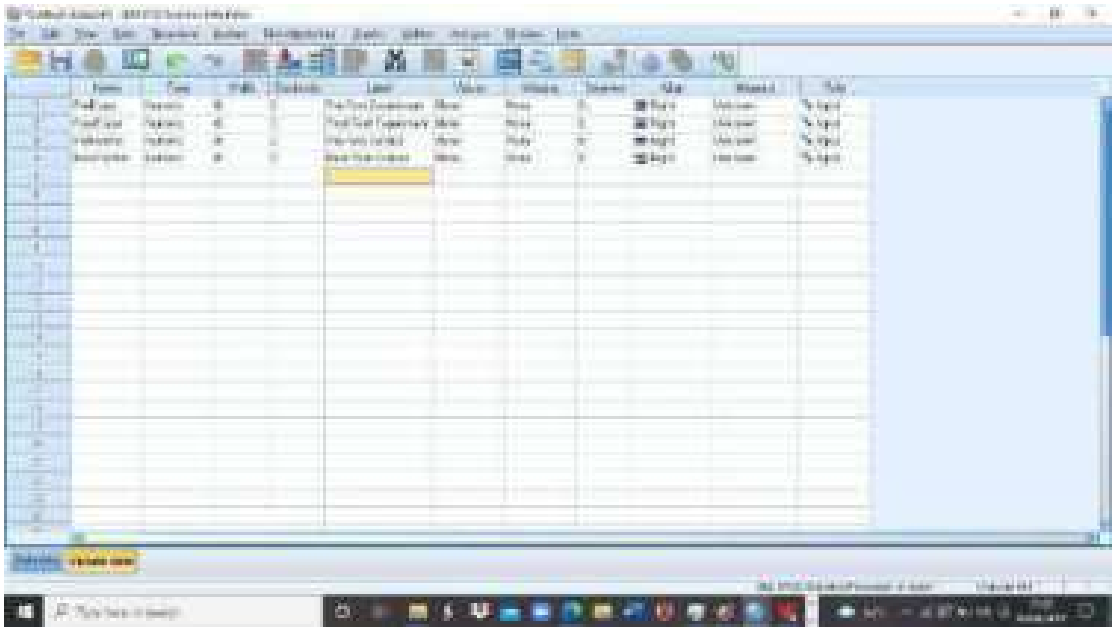
Research method
1. The research design used a quasi experimental
2. Collecting data using test (Pre test and post test experimental class and control class.
3. The experimental class used PBL Learning model, While the control class used the conventional learning model.

Research Data Analysis :
1. Descriptive analysis
2. Normality analysis
3. Paired sample t test (if the data is Normal)
4. Wilcoxon test (if the data is not normal)
5. Homogeneity test
6. The Independent sample t test (If the data is normal)
7. Mann whitney (if the data is not normal)

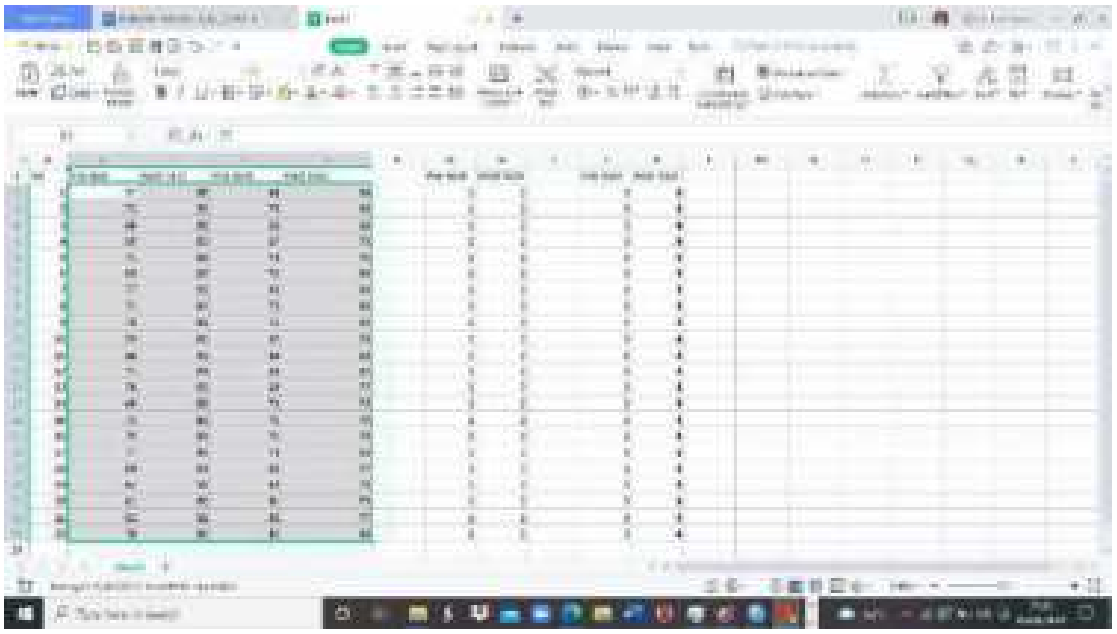
1. Go to excel to type the Data



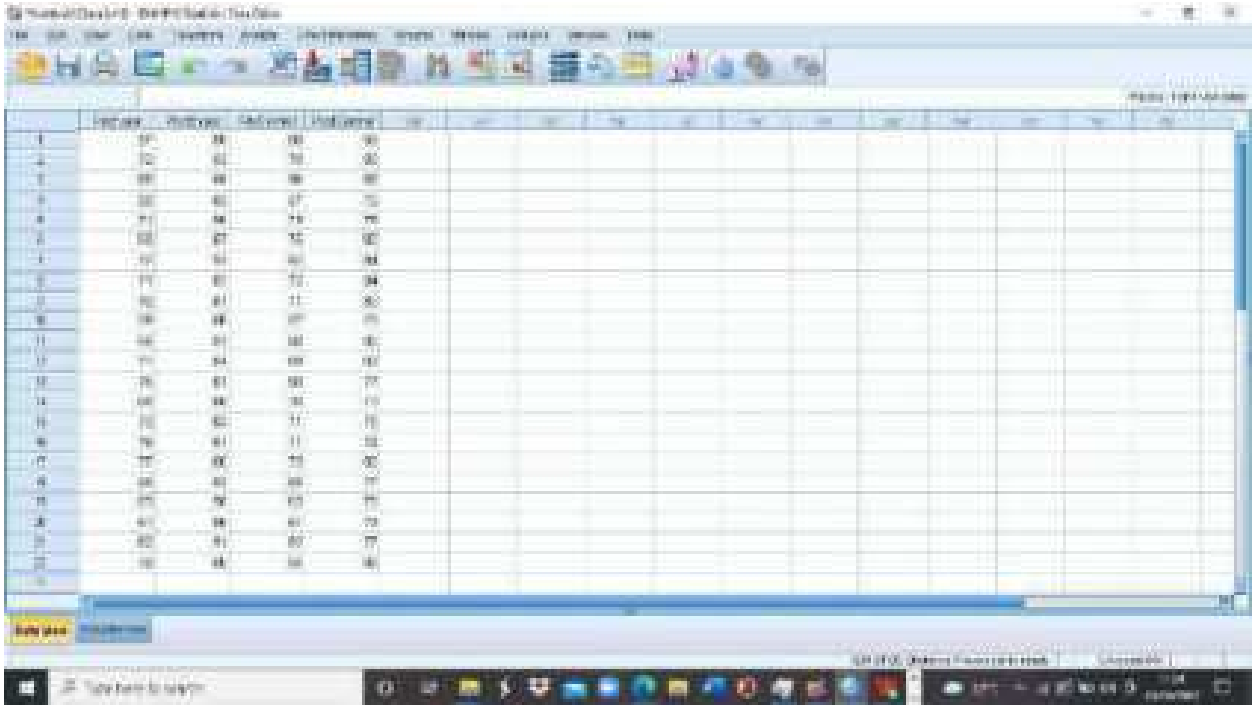
2 Go to SPSS-Variable View



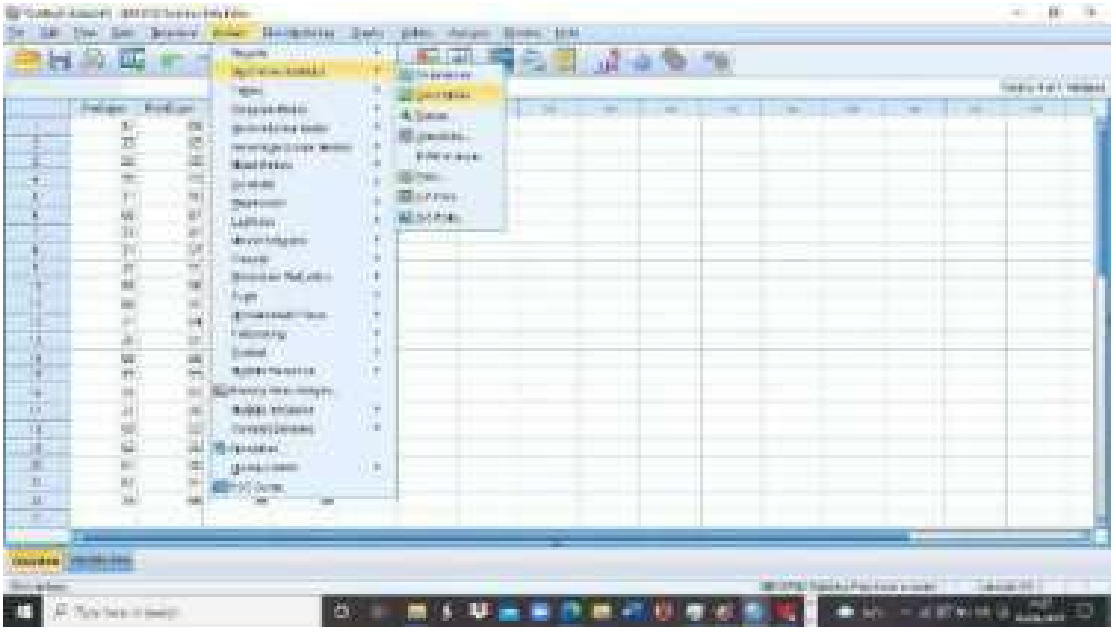
2. Go to excel ,Copy and paste the data from Pre test until post test control class



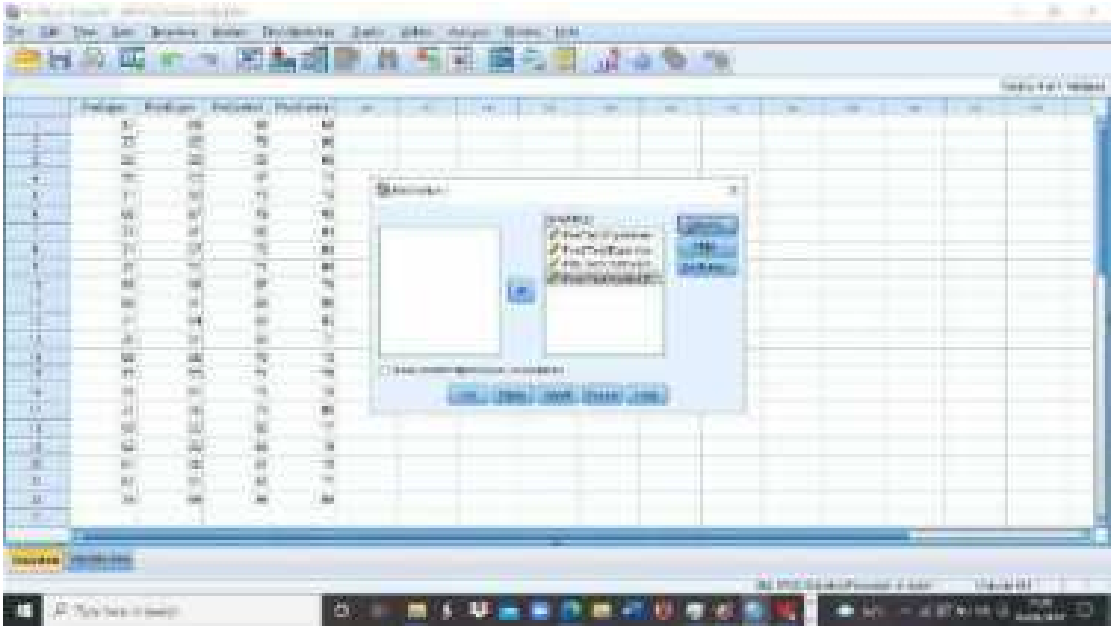
4 Go to SPSS - DATA VIEW PASTE THE DATA FROM EXCEL



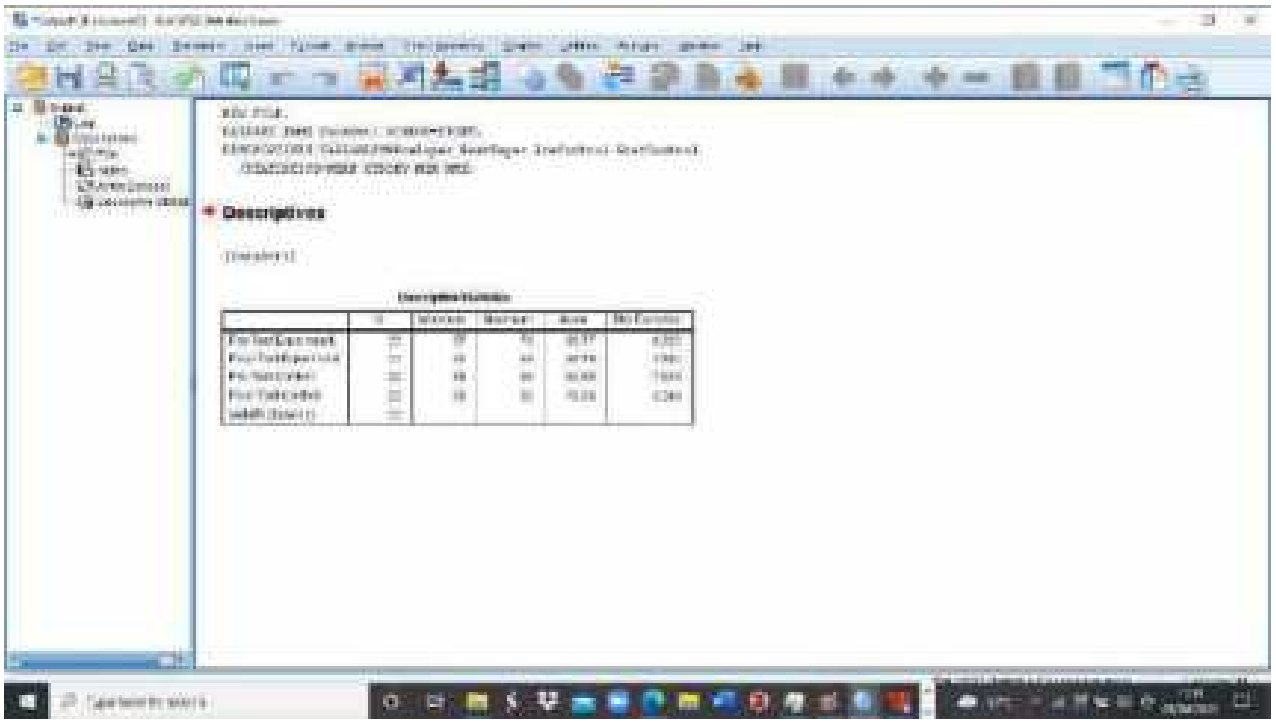
5 FIRST Go to DESCRIPTIVE ANALYSIS



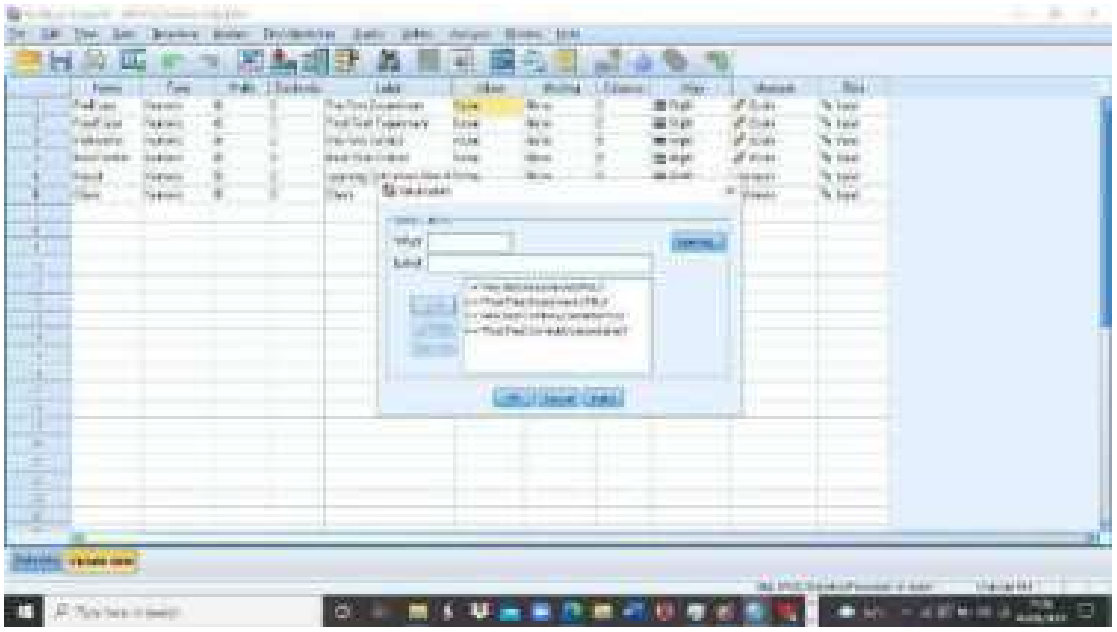
MOVE TO THE DAILOG BOX ON THE RIGHT-CLICK OPTION -CONTINUE -OK



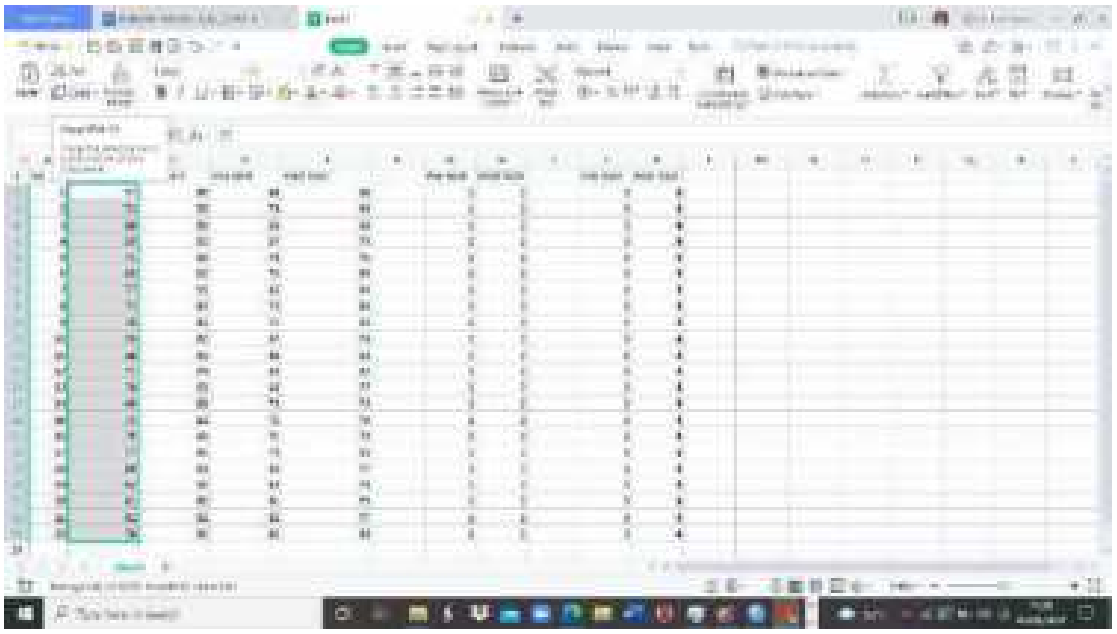
THE RESULT OF THE DATA DESCRIPTIVE ANALYSIS WITH SPSS



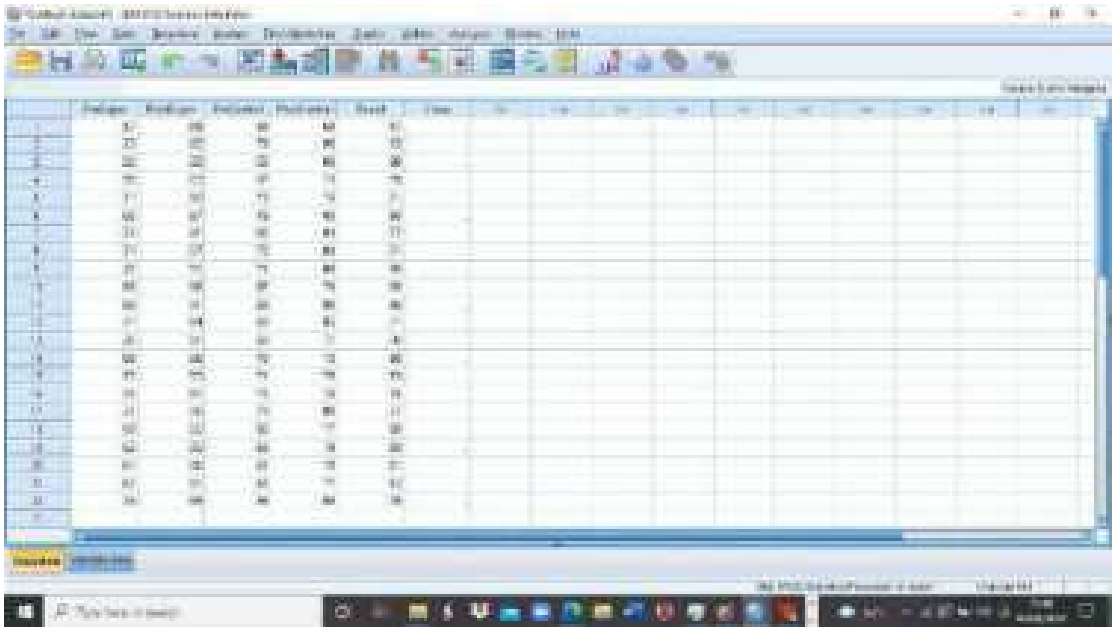
SECOND , GO TO NORMALITY TEST
CLICK AND TYPE ON THE VALUE ONE BY ONE



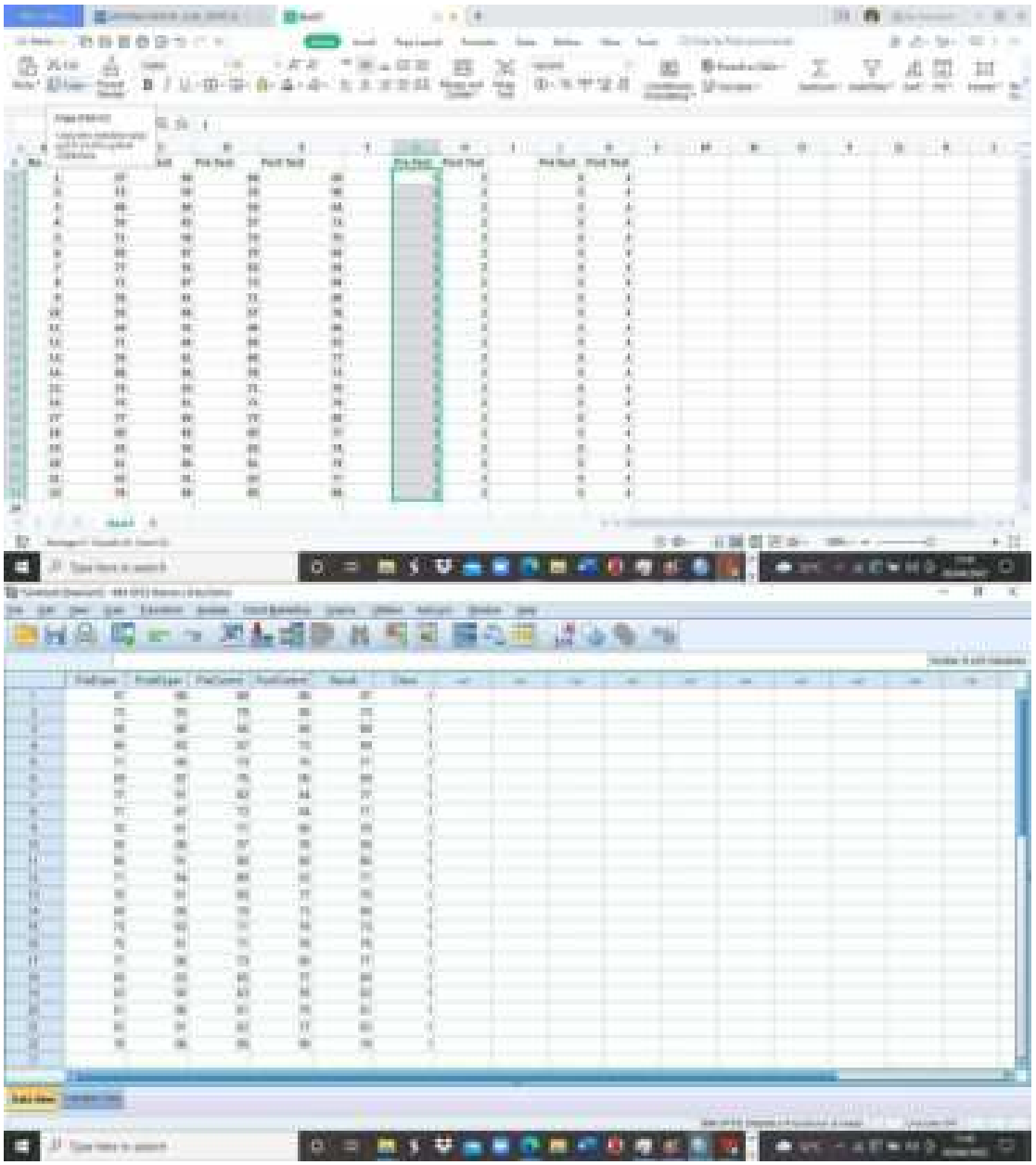
GO TO EXCEL COPY AND PASTE ONE BY ONE FROM PRE TEST (EXPERIMENT) TO SPSS



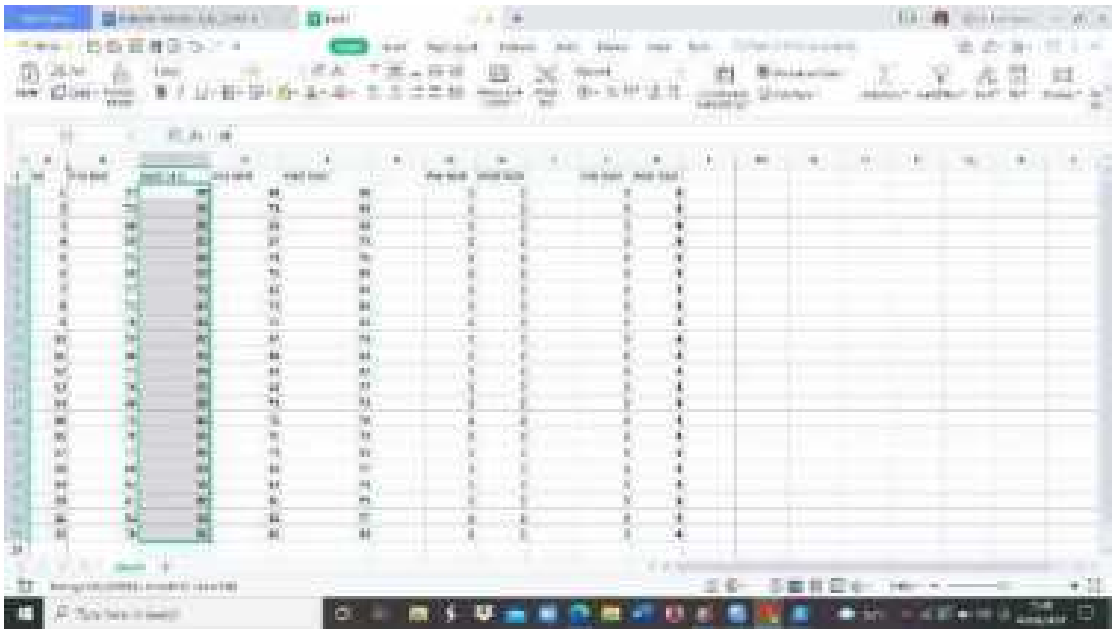
PASTE ON RESULT

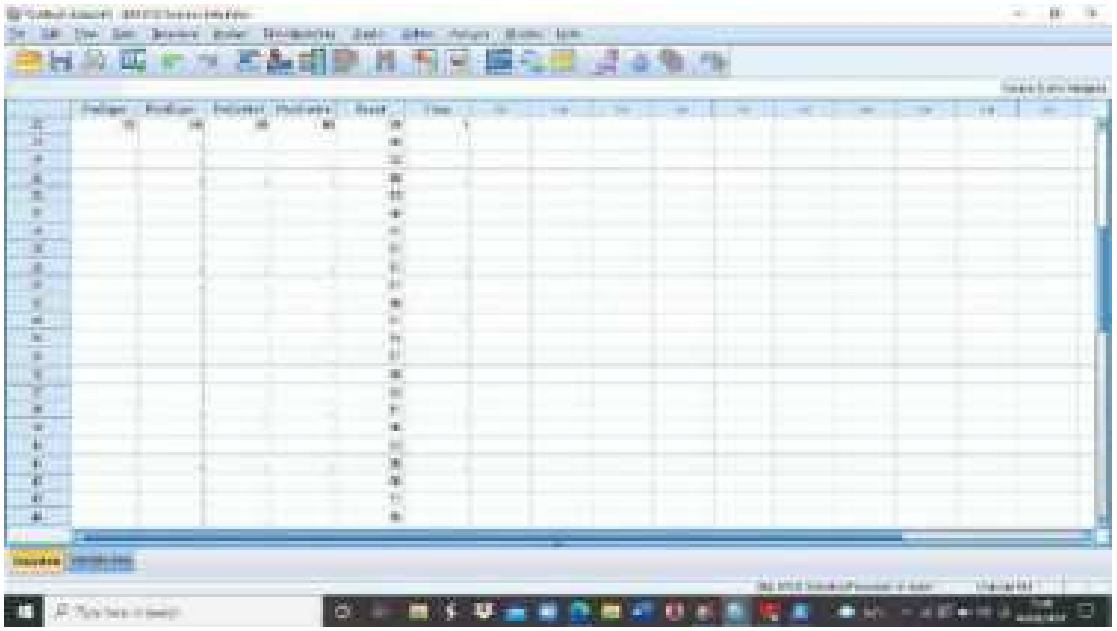


COPY AND PASTE CLASS FROM EXCEL

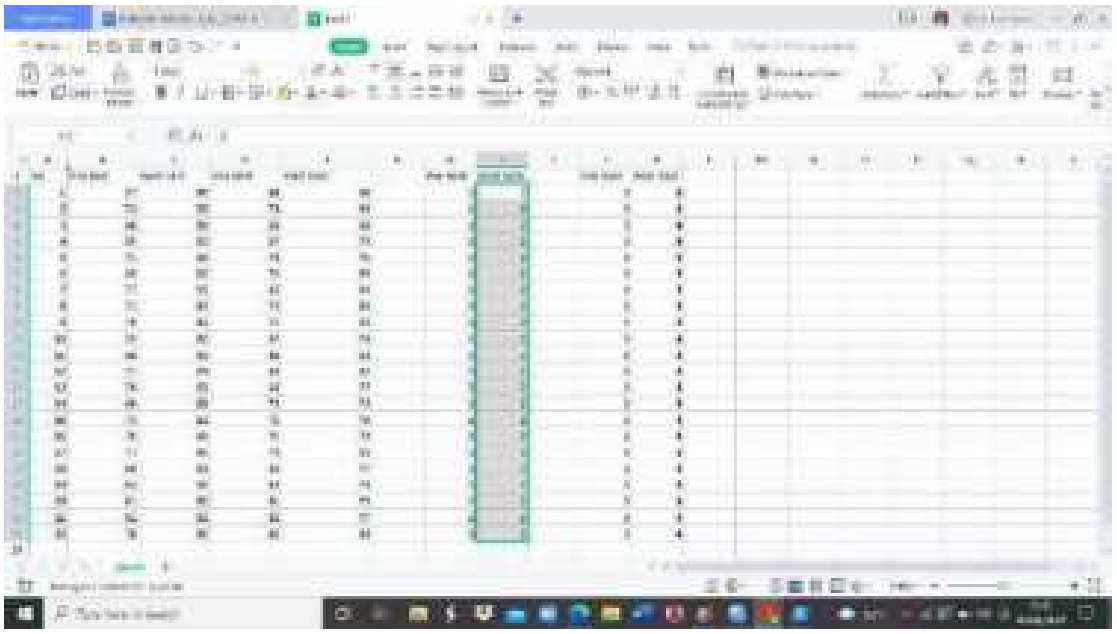


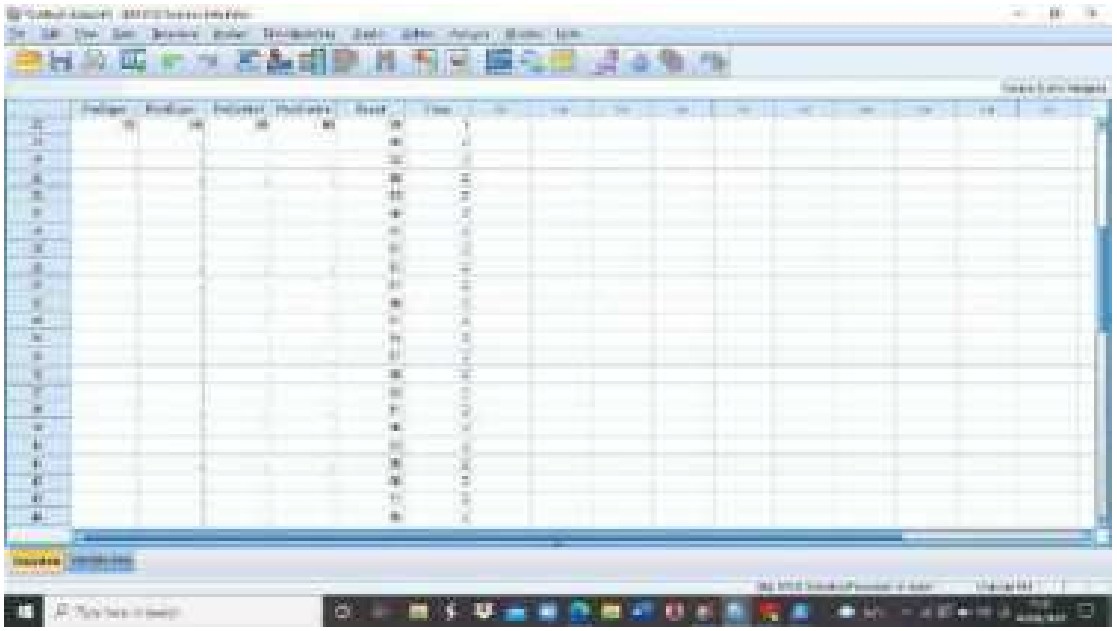
FOR NUMBER 23 RESULT COLUMN IN SPSS COPY AND PASTE FROM EXCEL POST TEST (PBL MODEL)



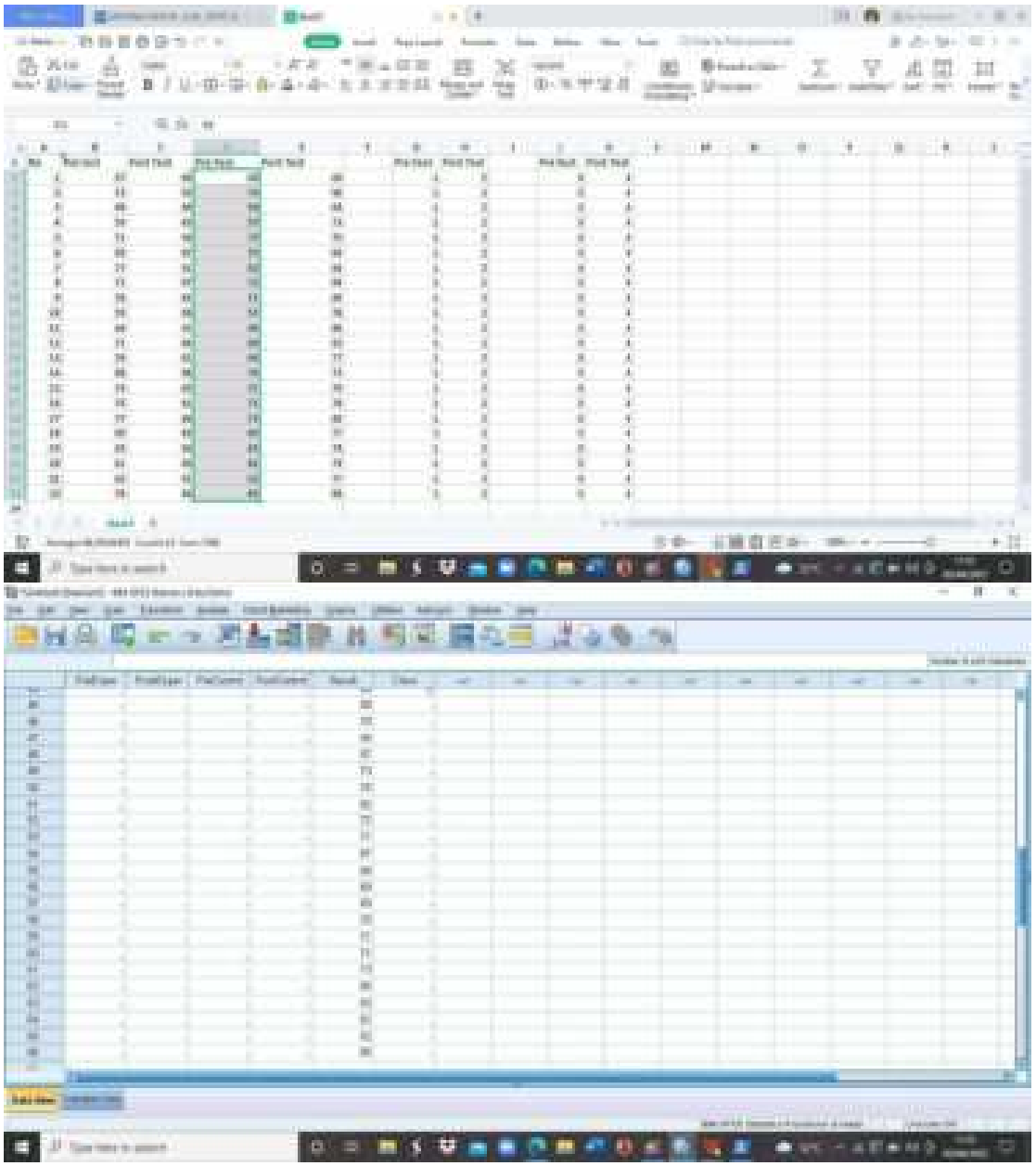


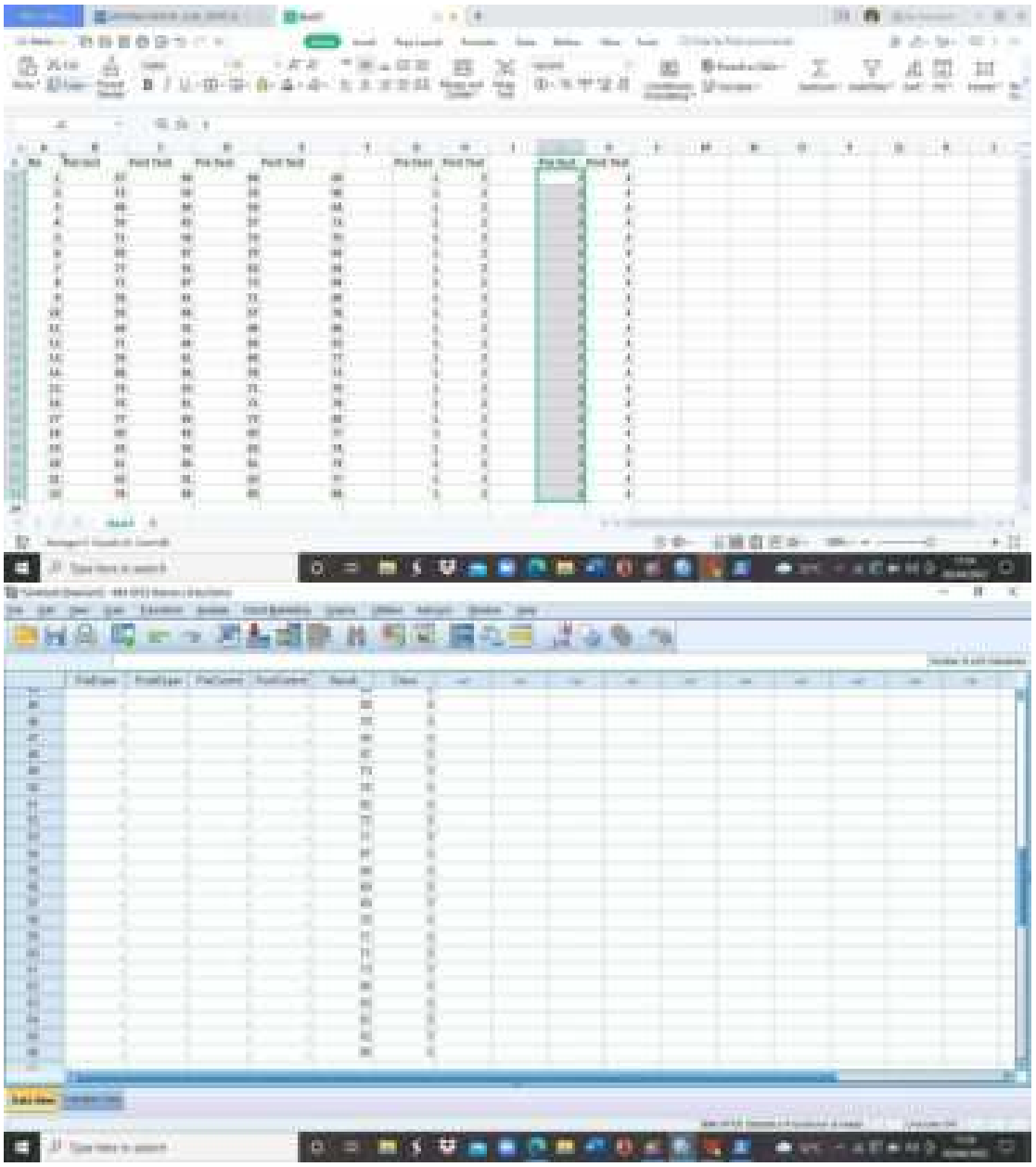
AND THEN, GO BACK TO EXCEL COPY THE CLASS (PBL MODEL) TO SPSS IN CLASS TABLE.



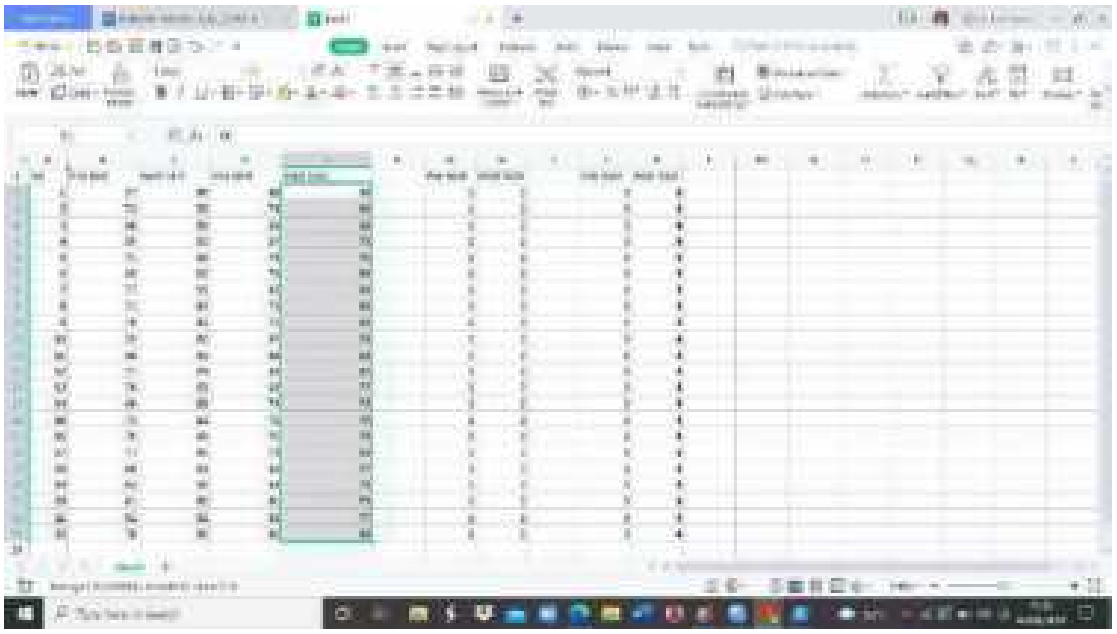


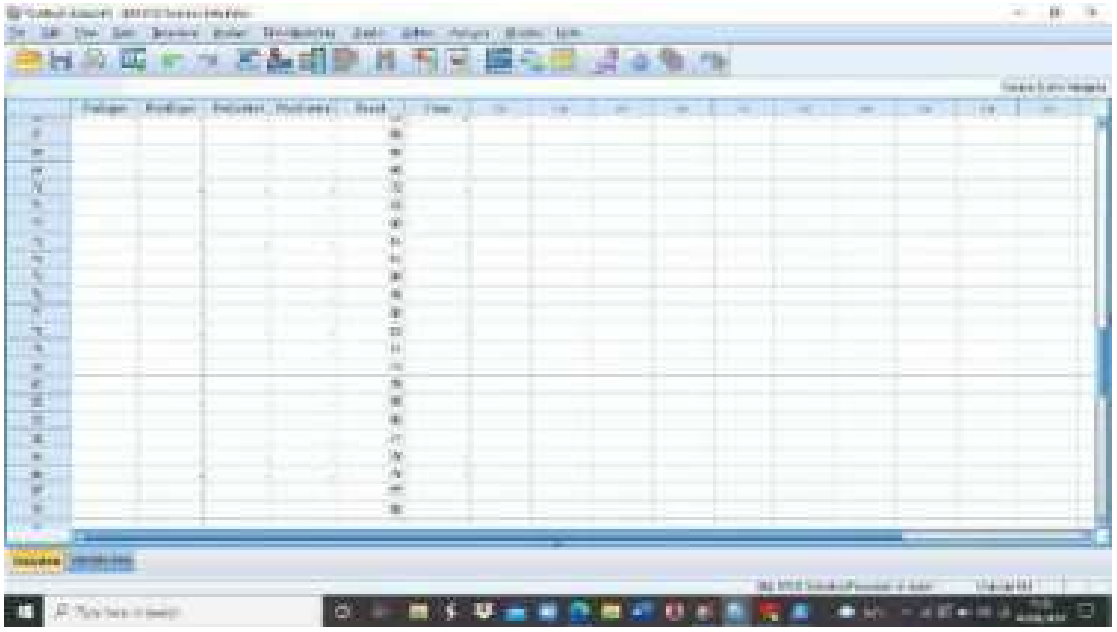
AFTER THAT GO TO EXCEL COPY THE PRE TEST (CONVENTIONAL MODEL) AND PASTE TO NUMBER 45 IN RESULT COLUMN

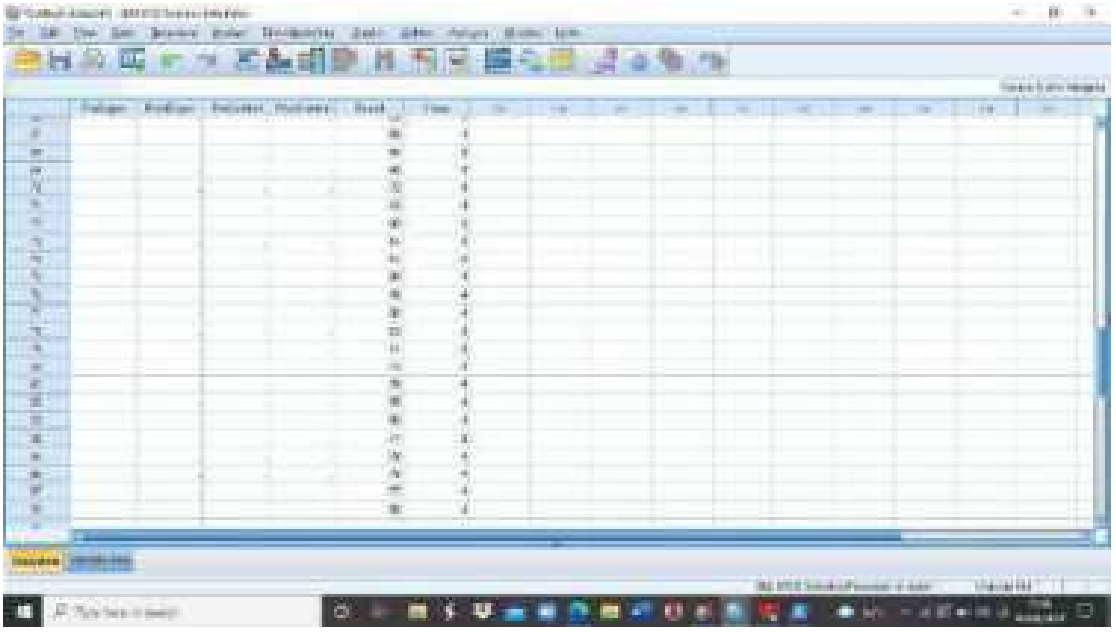




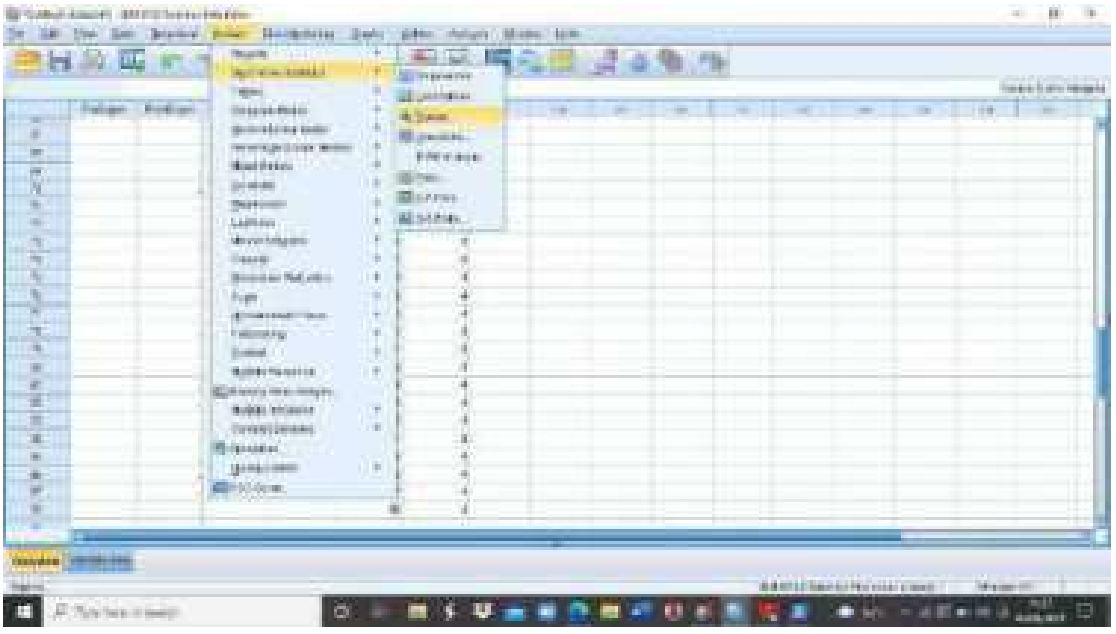
GO TO EXCEL COPY POST TEST SCORE (CONVENTIONAL MODEL TO SPSS.

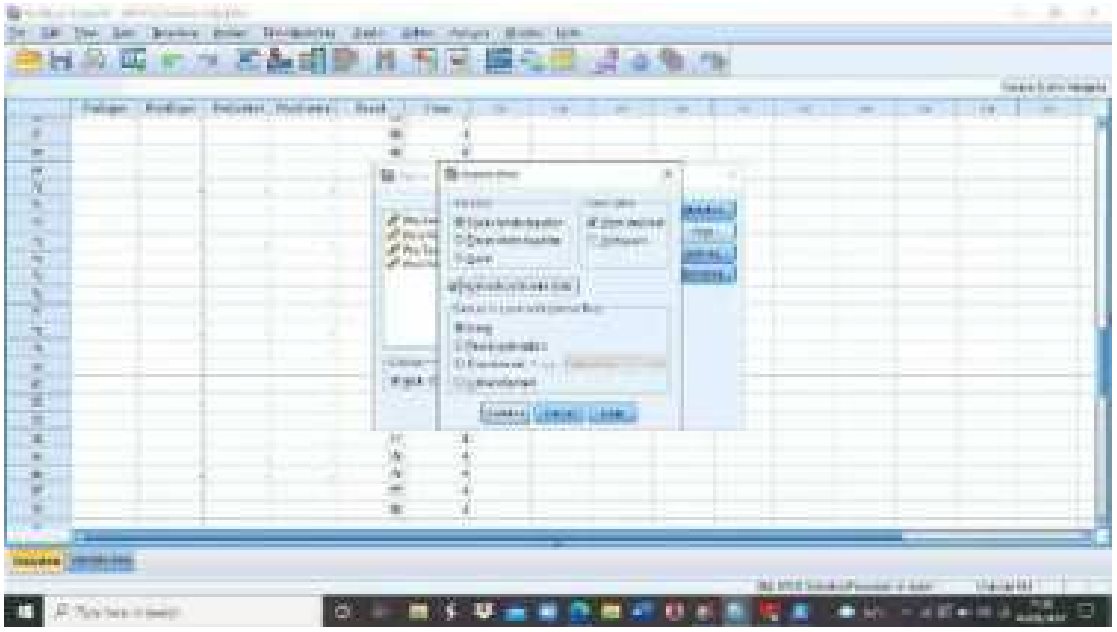


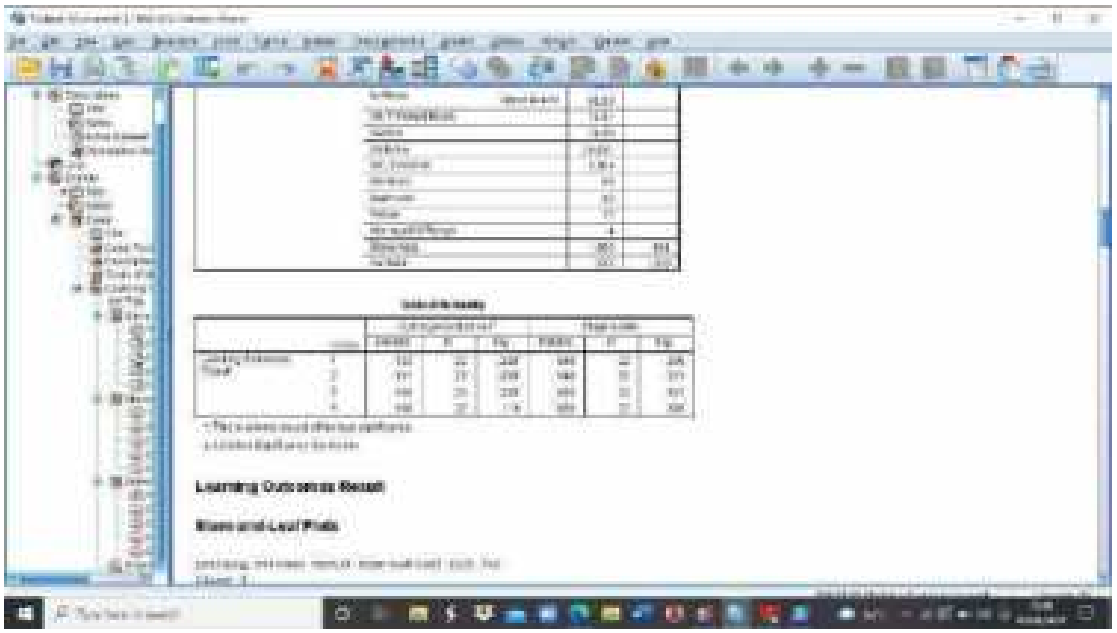




GO TO ANALYZE NORMALITY TEST-

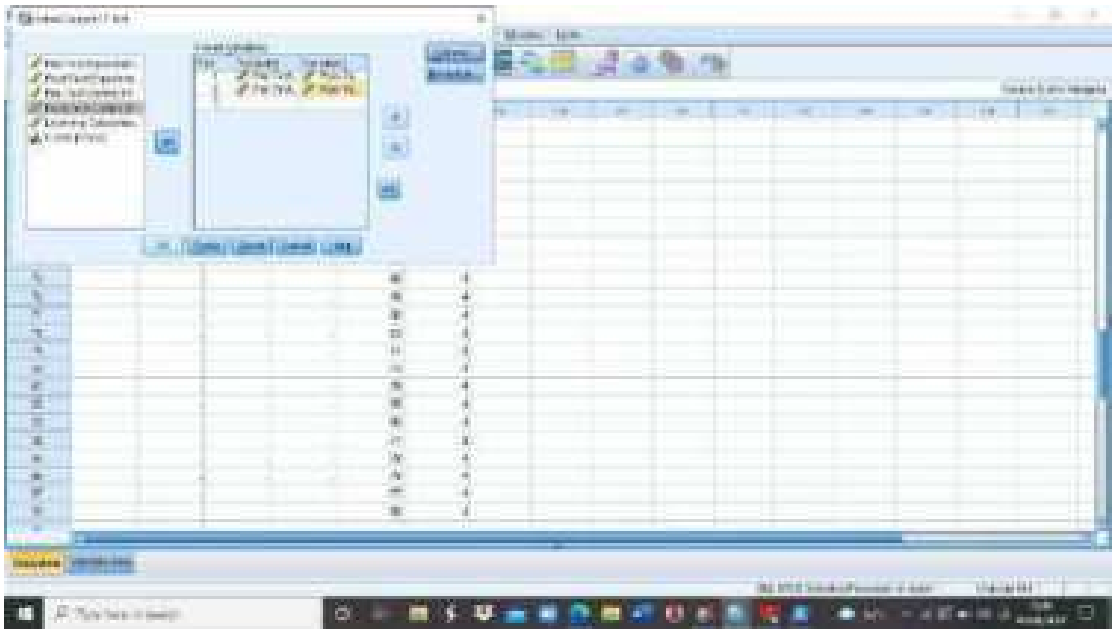


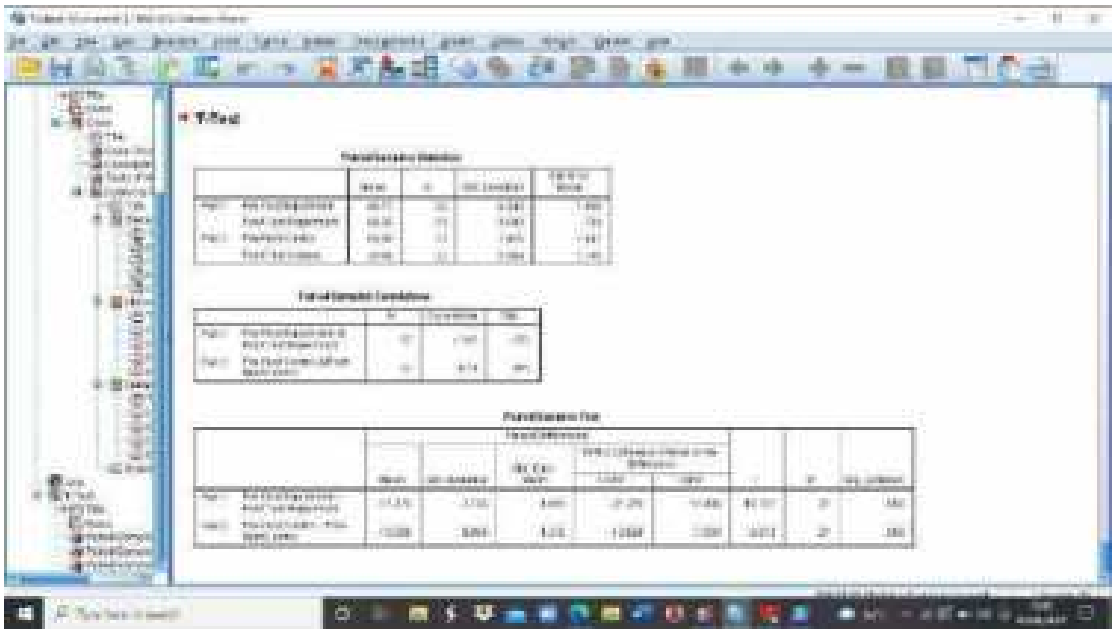




THE CONCLUSION IS
THE DATA DISTRIBUTED NORMALY

THIRD GO TO PAIRED SAMPLE T TEST (DATA IS NORMALLY)





CONCLUSION

Based on the discussion of the output pf pair 1

It can be concluded that there is effect of the problem based learning (PBL)ON student learning outcomes in English subject '' Genre test'' material.

T-Test

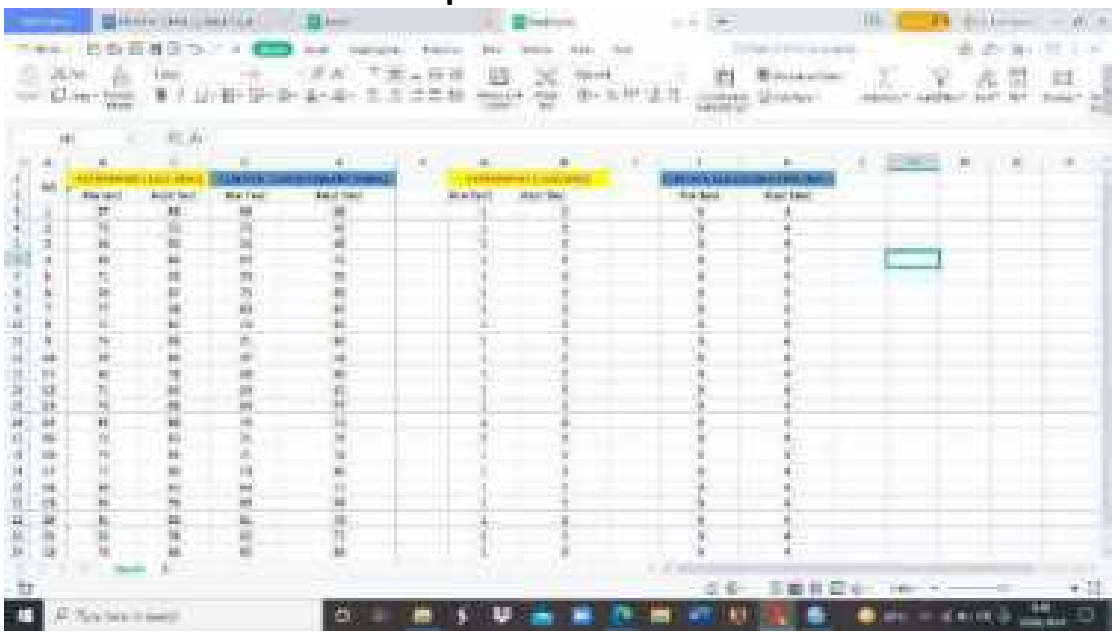
Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-Test Experiment	68.77	22	6.332	1.350
	Post-Test Experiment	86.55	22	3.582	.764
Pair 2	Pre-Test Control	68.55	22	7.915	1.687
	Post-Test Control	78.55	22	5.369	1.145

PART 2 EXPERIMENT &CONTROL CLASS DATA ANALYSIS :NORMALITY TEST &HOMOGENEITY TEST ,INDEPENDENT SAMPLE T TEST.

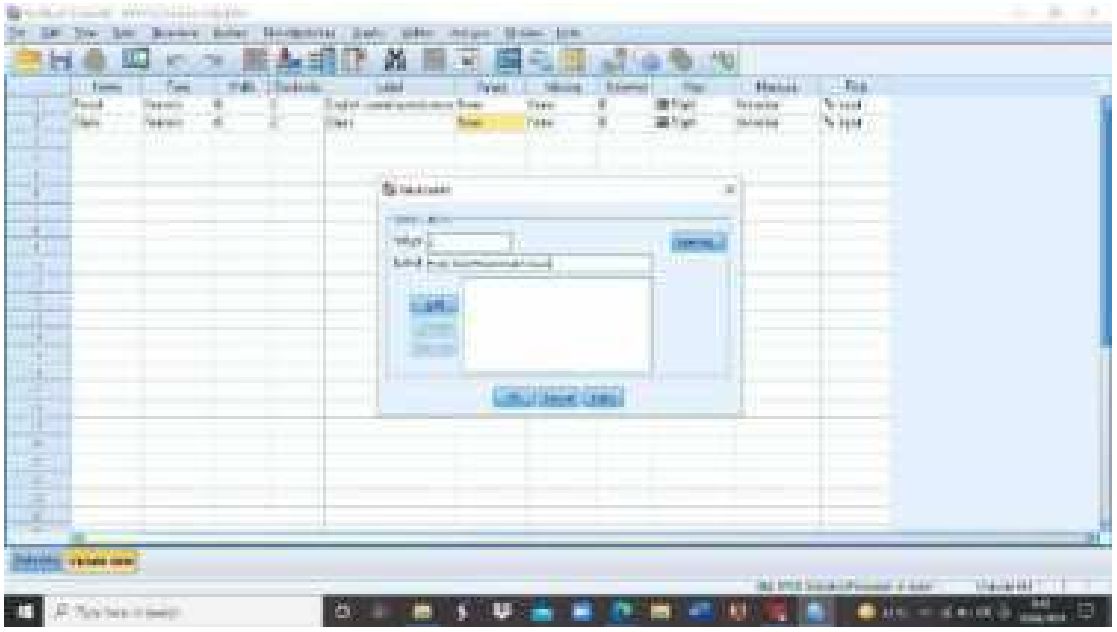
Part 2

1. Go to the data excel from part 1

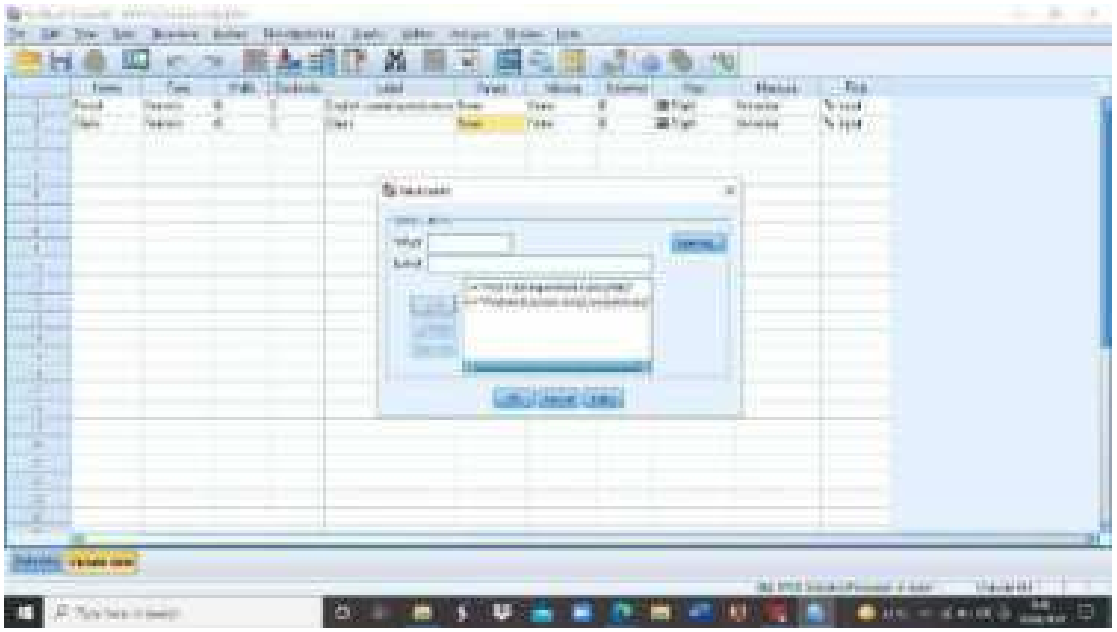


2,open the SPSS

Go To analysis spss practice .

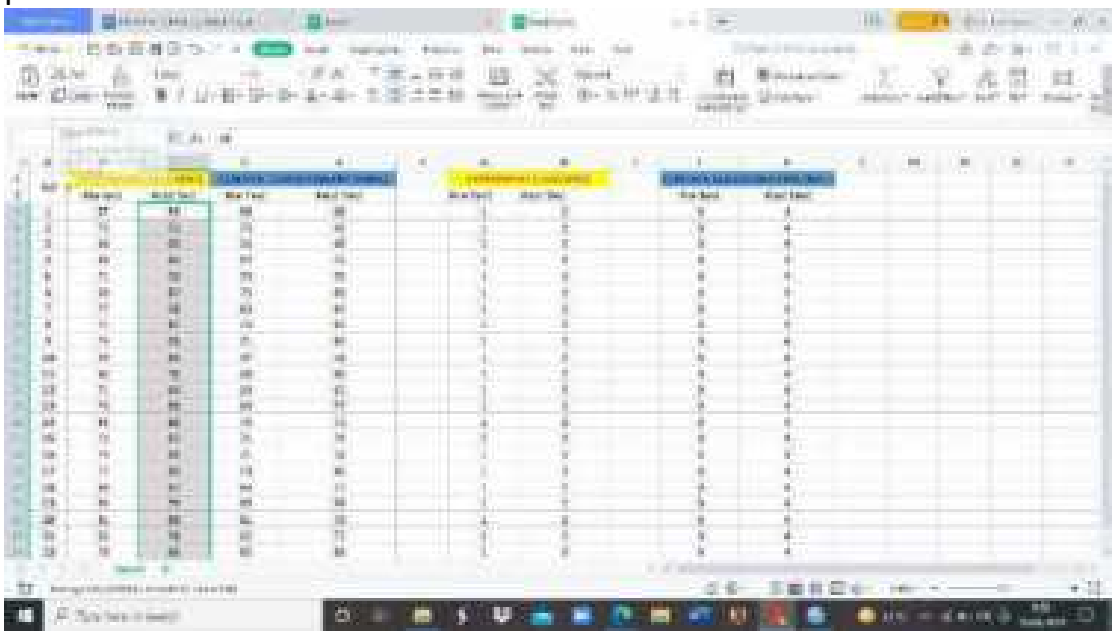


2. click and type in value 4 and label : Post test control class (conventional) -click OK

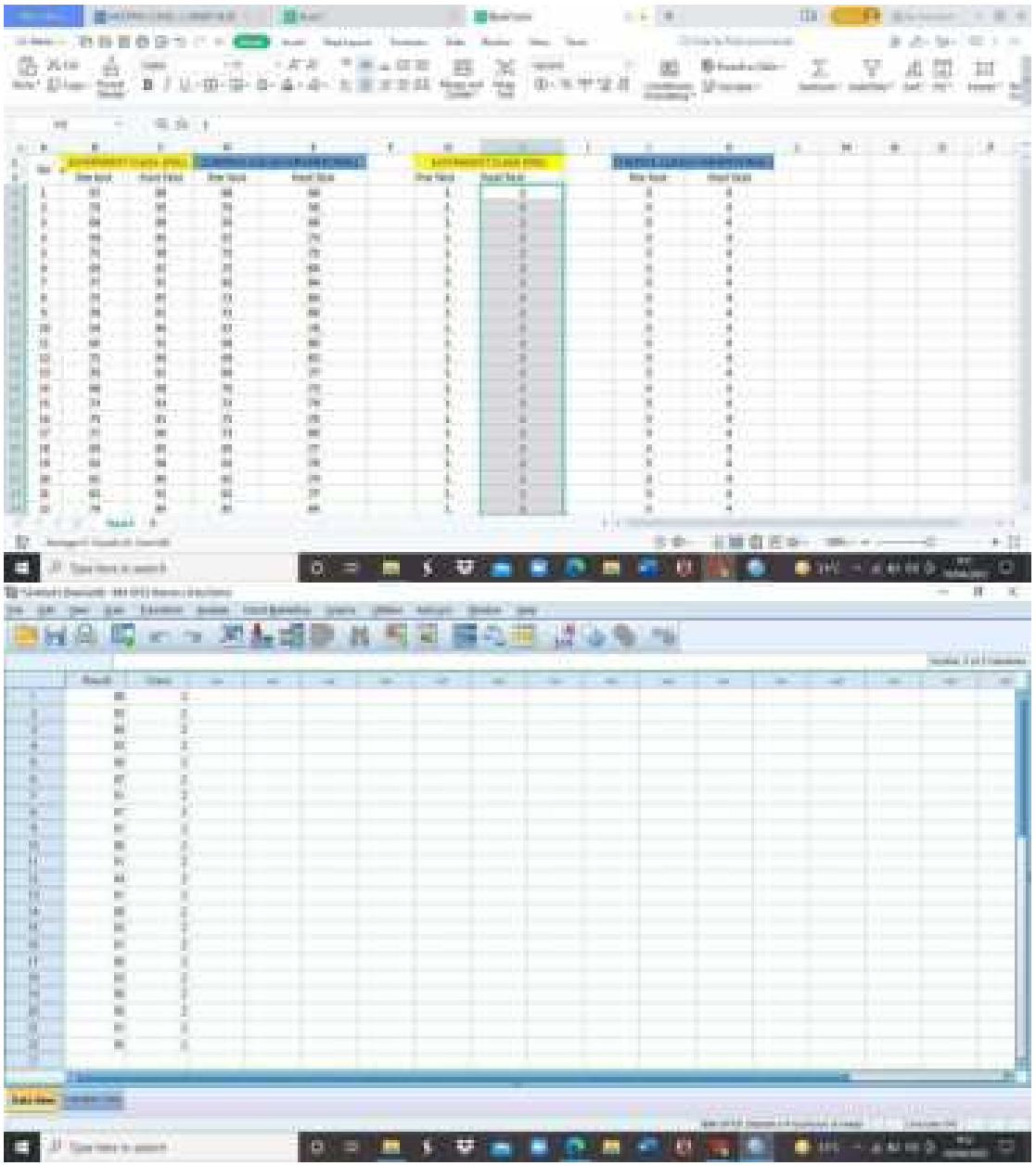


3. Go to Data view , on column research there are Result and Class

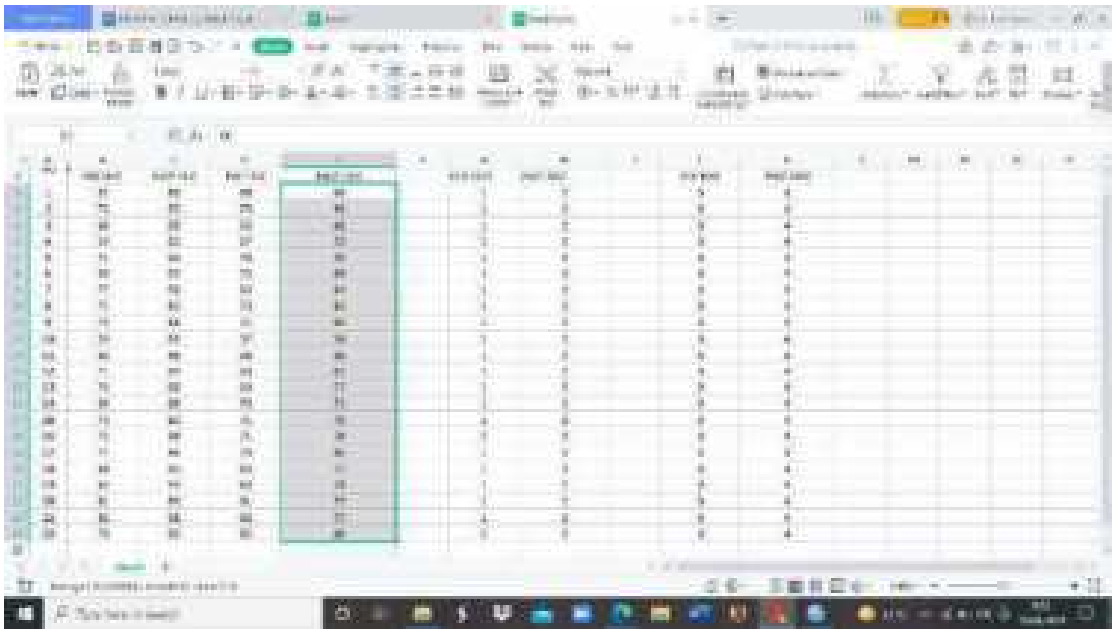
4. Move Copy the experiment class(PBL) POST TEST SCORE and then paste to SPSS



5. COPY and Paste the Data class experimet class(PBL) POST TEST TO SPSS

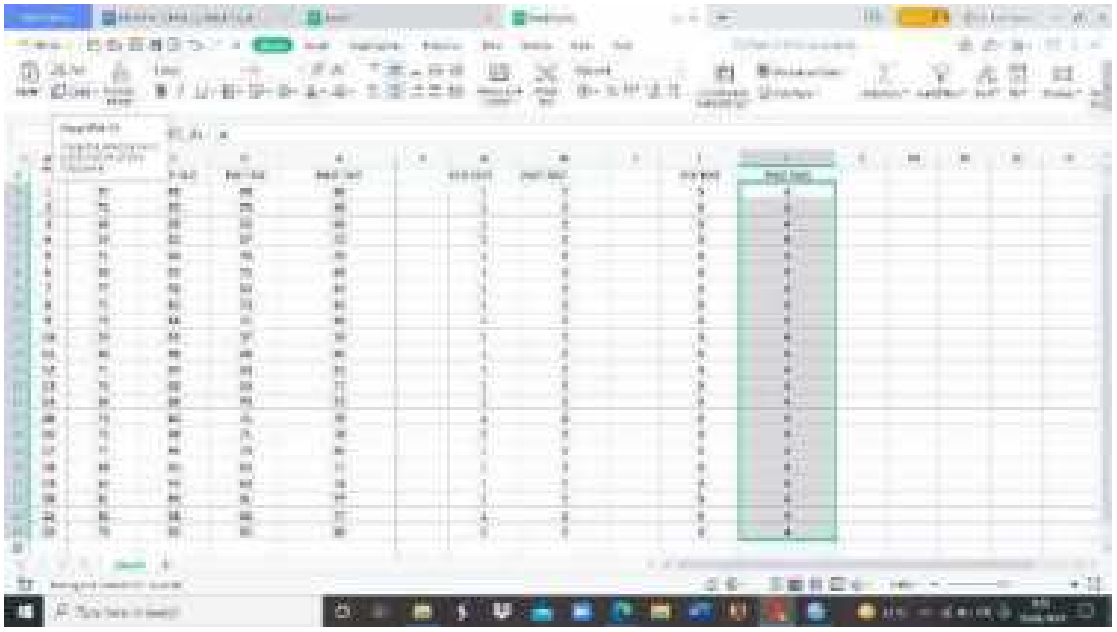


6.Go to excel copy and paste post test control class (conventional)to SPSS

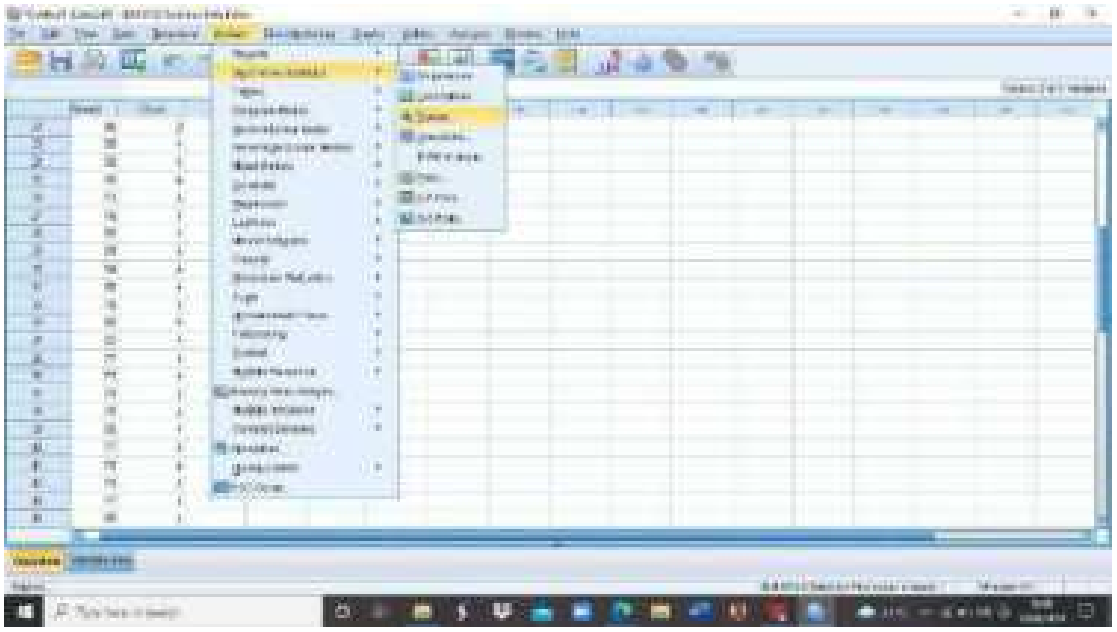


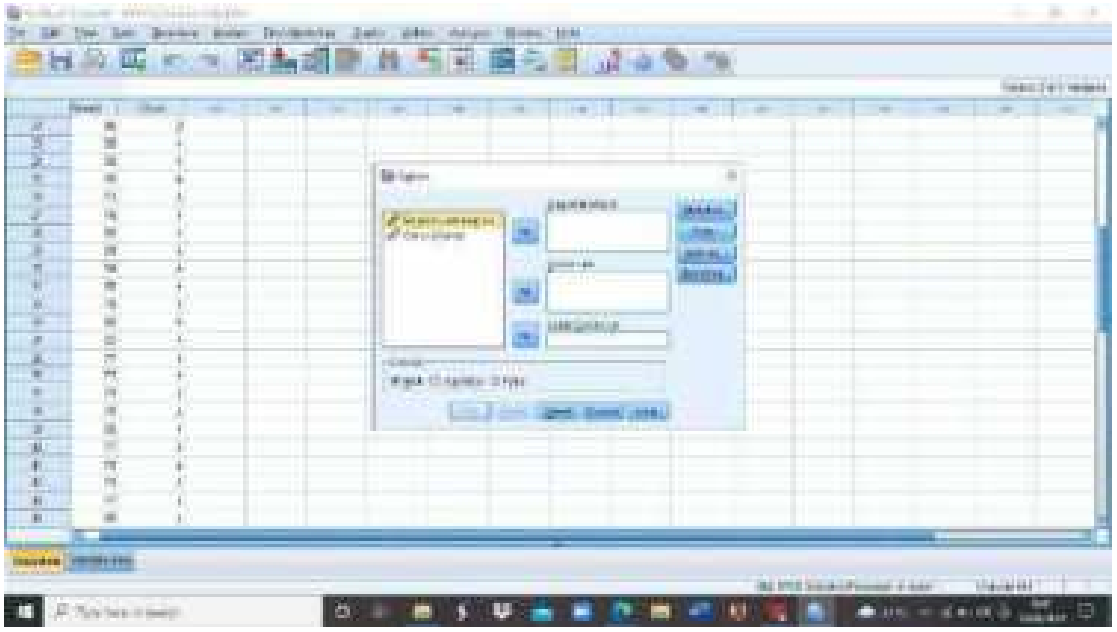
From line 23 until 44

6. Next , go to excel copy and paste the control class (conventional) post test

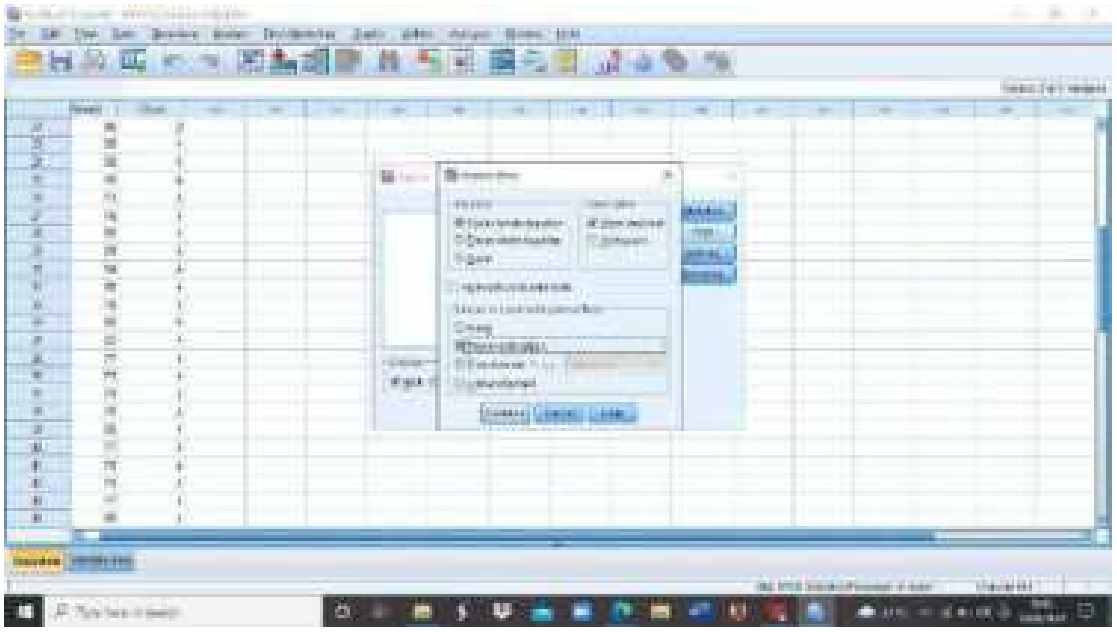


7. Next, go to homogeneity test
Go to spss -analyze -descriptive statistic-explore

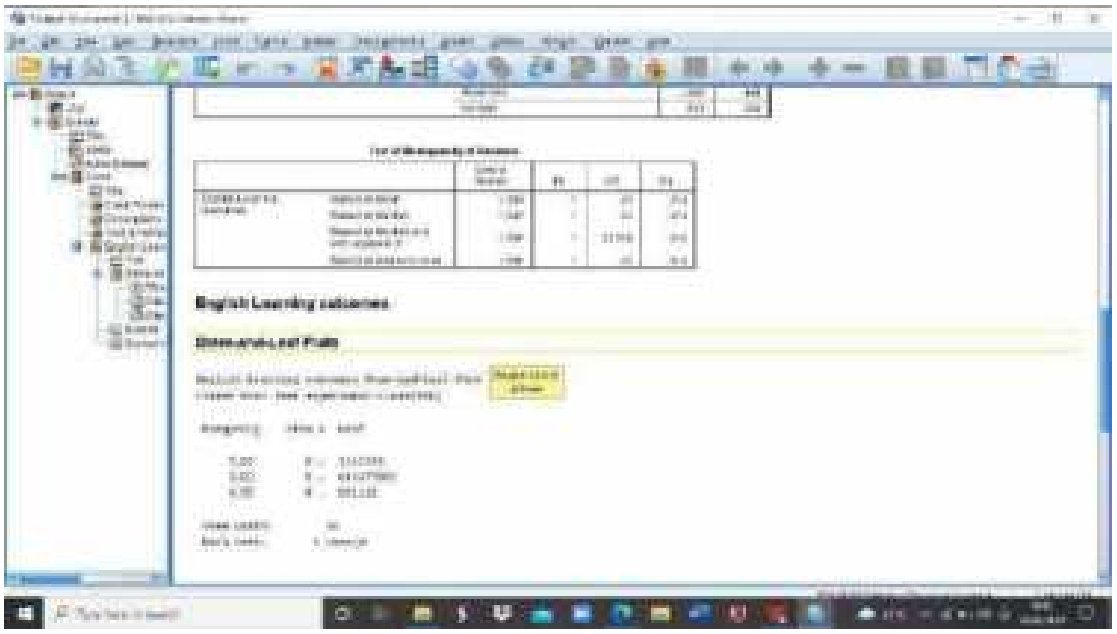




8. move english learning outcomes to dependent list on the right
   Move class to factor list on the right
   And then go to plot ,click power estimation for homogeneity test then click continue -OK



THE RESULT OF HOMOGENEITY TEST WITH SPSS

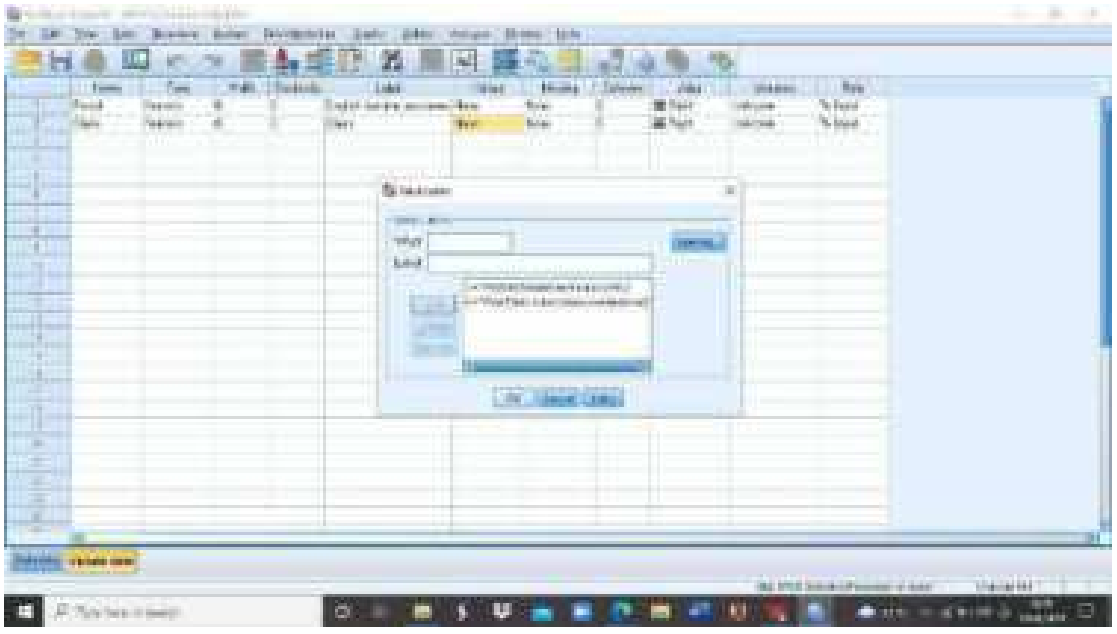


Homogeneity test interpretation

1.Based on the output above ,the value of sig(2-tailed). Based on Mean is 0,34 >0,05 ,so it can be concluded that the variance of the experimental class post-test data and control class post test data is the same or HOMOGENOUS

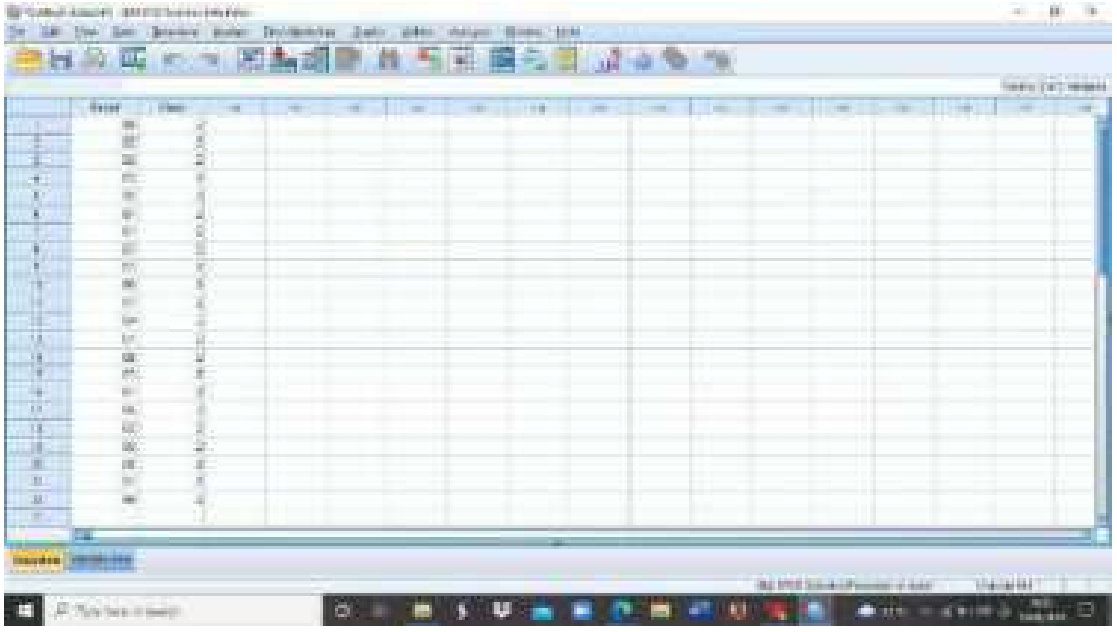
2.Thus, one of the requirements(not absolute) of the independent sample t test has been fulfilled.

9. Because the data is homogenous so , it can go to independent sample t test.

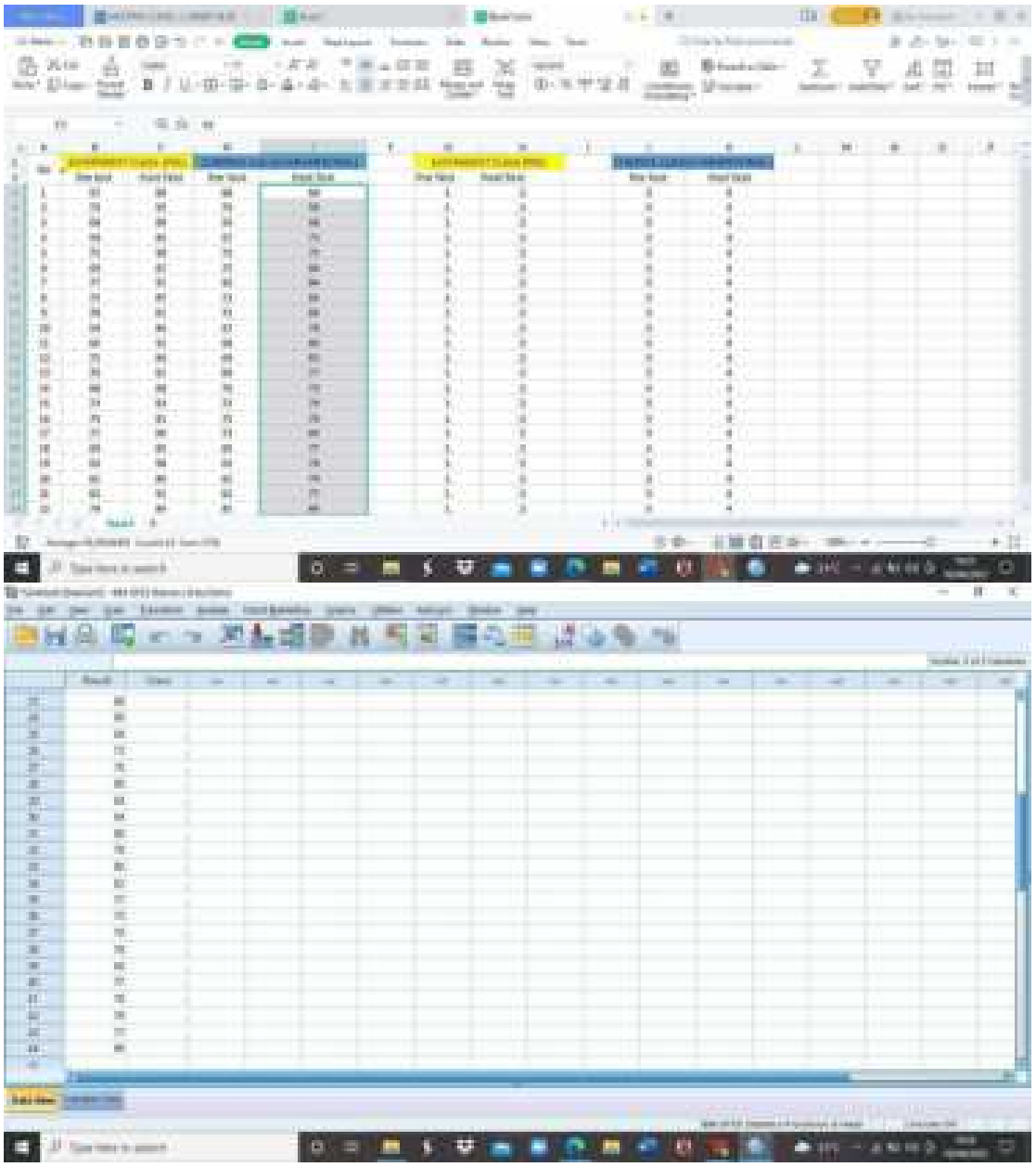


10. Copy and Paste the data post test experimental class(PBL) TO SPSS IN DATA VIEW

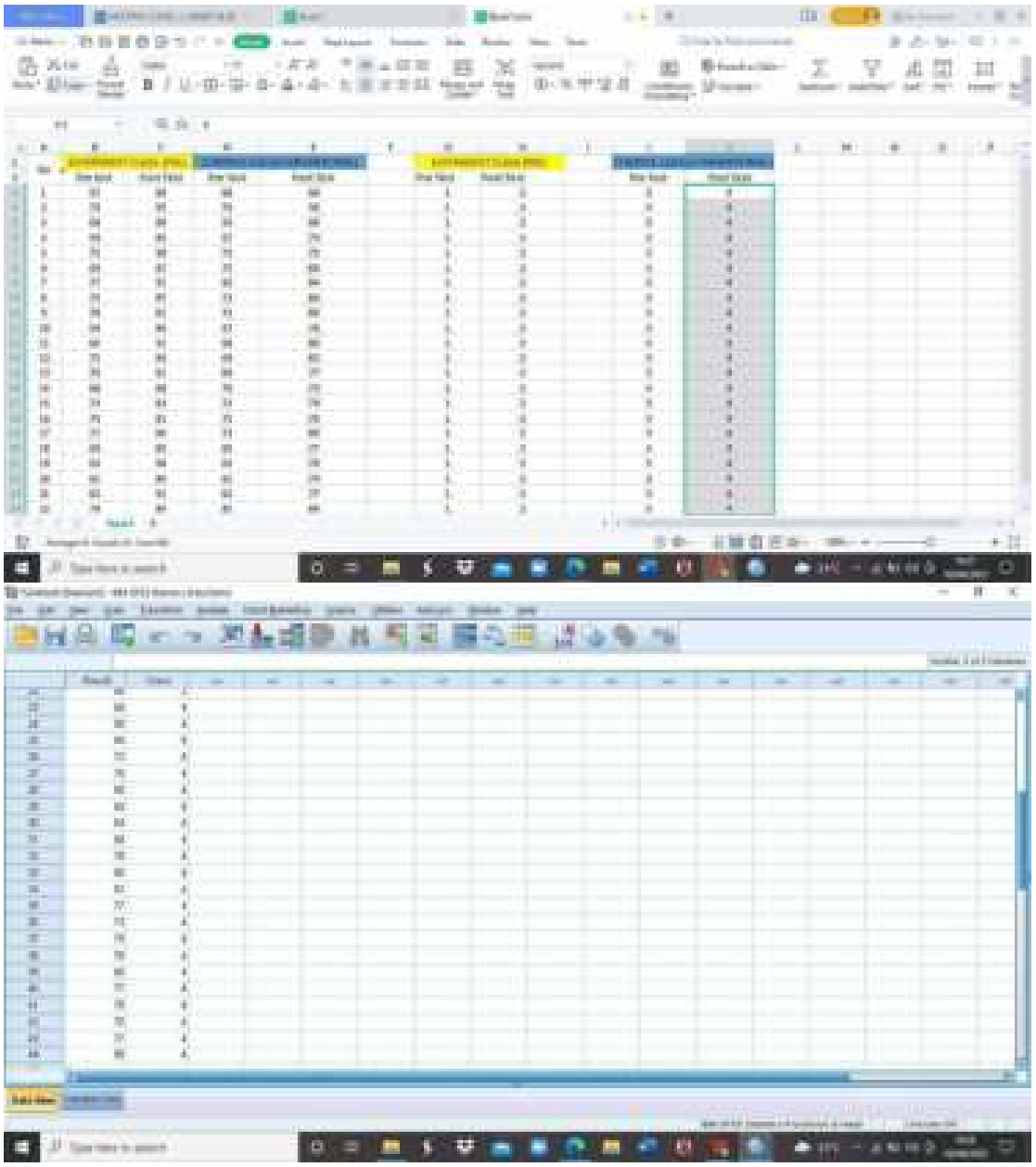
11.Go to the excel copy and paste the code post test Experimental class(conventional)



12 then, go to post test the control class(conventional)
Copy and paste to SPSS from the excel in column result of number 23 until 44

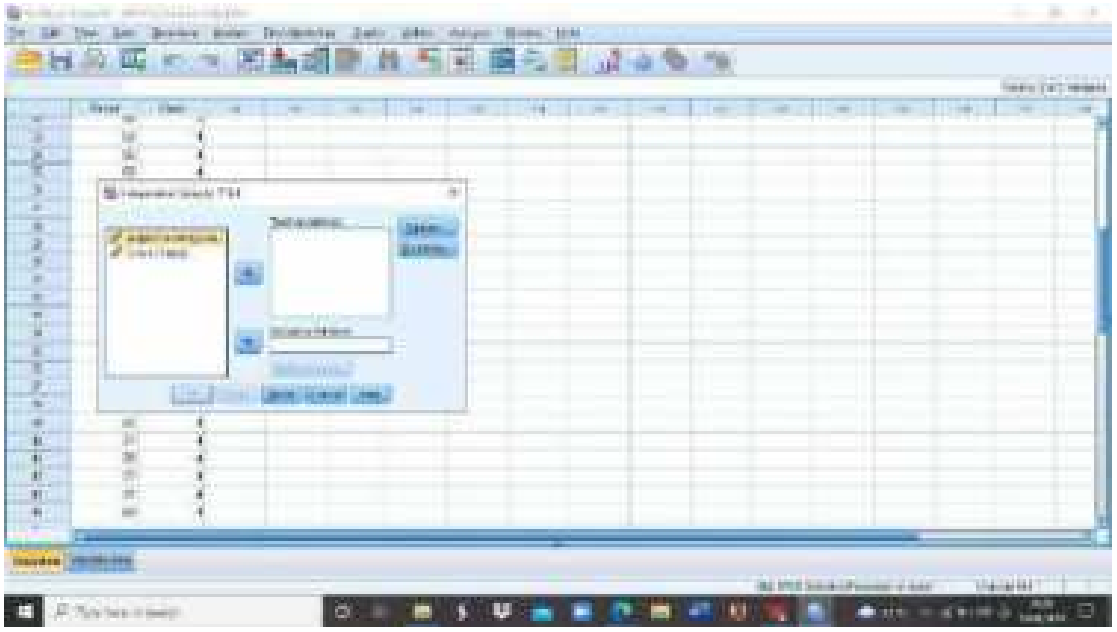


Then , back to excel data. Copy and paste code post test control class(conventional)



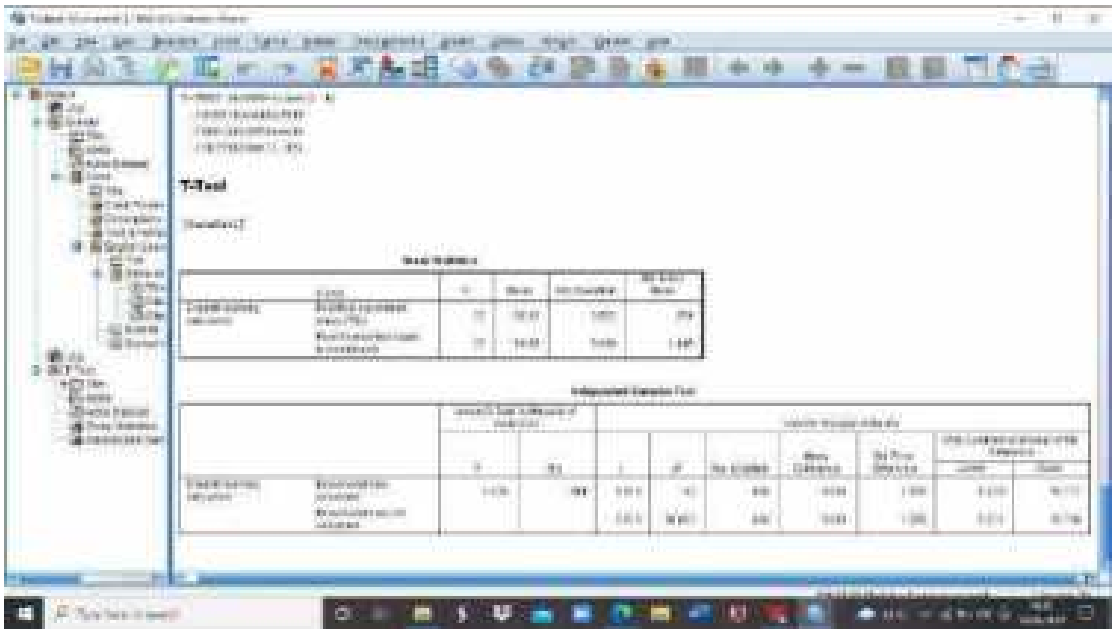
Then , go to SPSS (Independent sample t test)

Click analyze-compare means -Independent sample t test



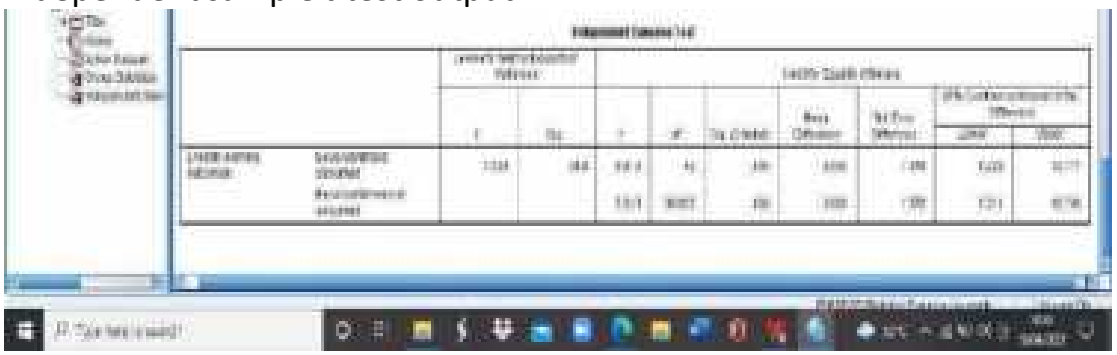
13. Move english learning outcomes to test variable(s) on the right and move the class to grouping variable on the right box.And then, click below box define group.

Based the code group 1 type code 2 for post test experimental class(PBL)
Group 2 type code 4 for post test control class (conventional)



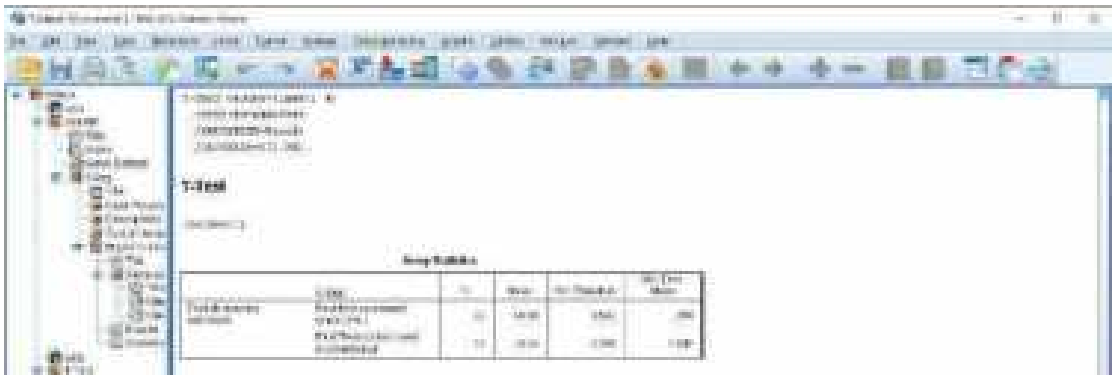
There two outputs . Group statistic and independent sample t test.

Independent sample t test output.



The conclusion of Independent sample t test

Based on the output above ,the value of sig.(2-tailed) of 0.00 <0.05 ,it can be concluded that there is a difference in the average student learning outcomes between the problem based learning (PBL) learning model and the conventional model.



The conclusion of Group statistics , based on the score of post test using PBL model is increase.Mean 86.55.

So, PBL learning model is improve English learning outcomes.

12. PEARSON PRODUCT MOMENT VALIDITY TEST FOR QUESTIONNAIRE WITH SPSS

PEARSON VALIDITY TEST BASIC CONCEPTS

1. Validity test is useful to find out the validity or suitability questionnaire used by researchers in measuring and obtaining research data from the respondents.
2. Research questionnaires are said to be of high quality if their validity and reliability have been proven.
3. Pearson product-moment validity test uses the principle of correlating each questionnaire item score and the total score of the respondents' answers (Everitt & Skrondal, 2006; Field, 2005; Garth, 2008; Rusydi & Fadhli, 2018; Singh, Kumar, 2006).

PEARSON VALIDITY TEST CASE EXAMPLE

RESEARCH TITLE: **"The Influence of Perceptions on the Importance of Self-Efficacy in English Students on the Improvement of Teaching Skills at PGRI Semarang University in the Academic Year of 2022"**

The RESEARCH INSTRUMENT is a questionnaire in the form of a checklist using a Likert scale.

ANSWER SCORING:

Strongly Agree (SS) = 5
Agree (S) = 4
Doubtful (RR) = 3
Disagree (TS) = 2
Strongly Disagree (STS) = 1

PRACTICE: Conducting a validity test for each item of the questionnaire on the Perception variable regarding the Importance of Self-Efficacy.

PEARSON VALIDITY TEST STEPS WITH SPSS

INPUT – ANALYSIS – OUTPUT

BASIC DECISION MAKING FOR PEARSON VALIDITY TEST

❖ Comparing the value of rcount with rtable

1. If the value of rcount > rtable = valid
2. If the value of rcount < rtable = invalid

The way to find the rtable value with N=20 at 5% significance is to look at the distribution of the statistical rtable value. Based on the distribution of the statistical rtable value, the rtable value of 0.444 was obtained.

❖ Taking the decision based on the results of the significance value (Sig.)

1. If the Significance value < 0.05 = valid
2. If the Significance value > 0.05 = invalid

PEARSON VALIDITY TEST RESULTS SUMMARY

Item No.	rcount	rtable 5% (20)	Sig.	Criteria
1		0.444		Valid

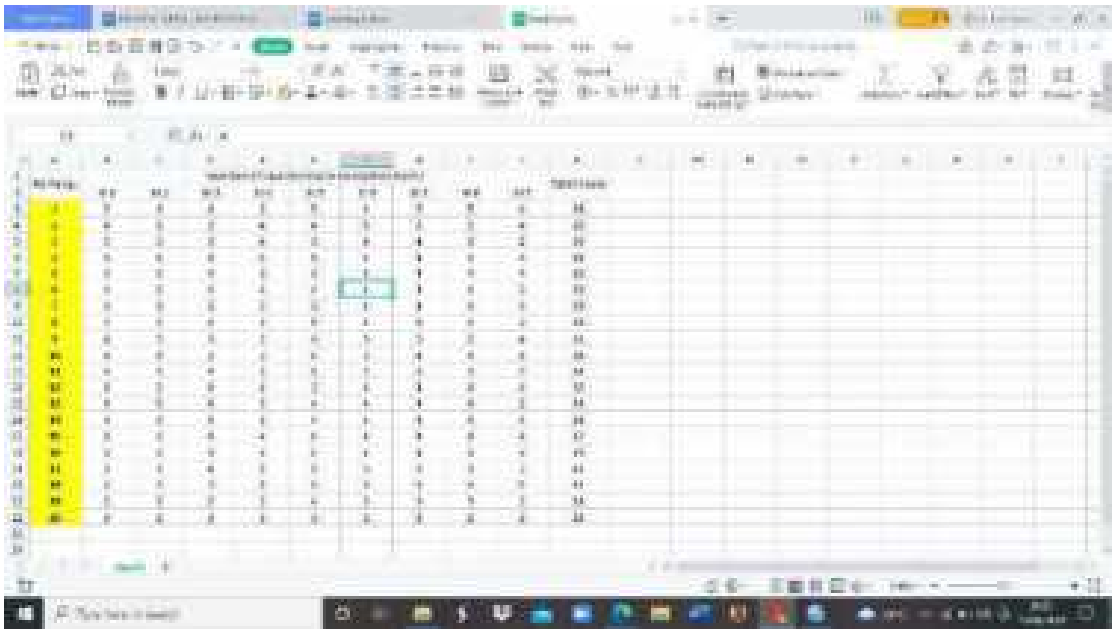
2	0.444
3	0.444
4	0.444
5	0.444
6	0.444
7	0.444
8	0.444
9	0.444

PEARSON VALIDITY TEST QUESTION

1. There is a theory which states that the way to find rtable is N-2, so which one is correct?
2. The rcount is negative, but the significance is <0.05, what is the conclusion?
3. How to deal with invalid questionnaire items?
4. Can a questionnaire using true-false statements be tested for validity in this way?

TUTORIAL & PRACTICE
PEARSON PRODUCT MOMENT VALIDITY TEST FOR QUESTIONNAIRE WITH SPSS

1. Go to excel word type the data



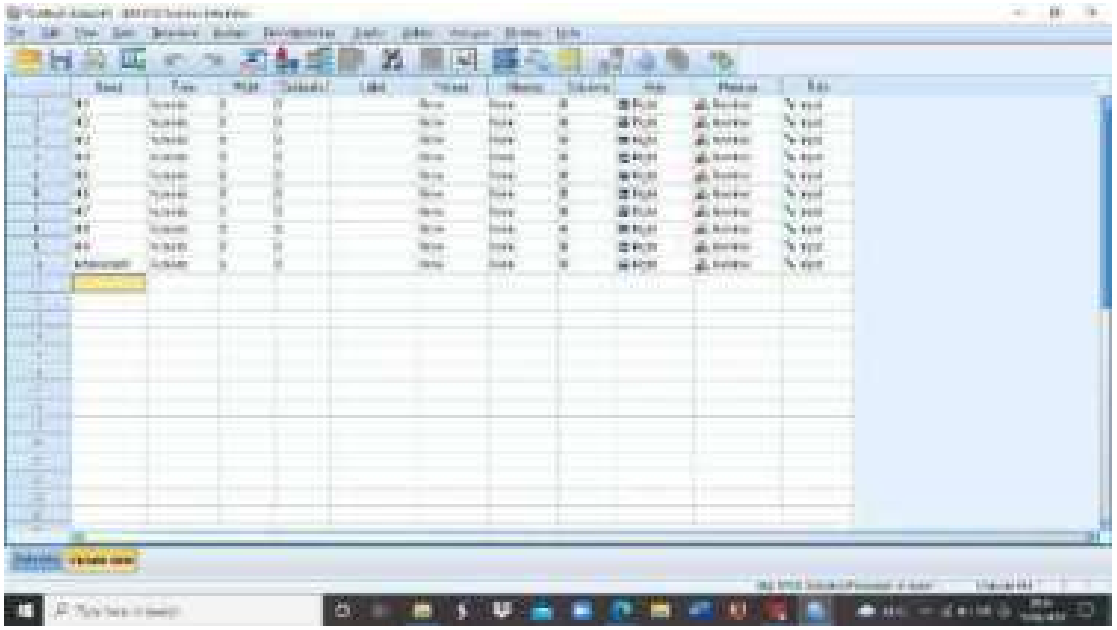
Pearson validity test case example
Research Title ‘’The Influence of Perception on the Teacher Students’ Self -Efficiency toward the Improvement of Teaching Skills in Universitas PGRI Semarang in the Academic Year of 2022’’

The Research Instrument is a questionnaire in the form of a checklist using a likert scale:
Answering scoring
Strongly Agree (SA)=5

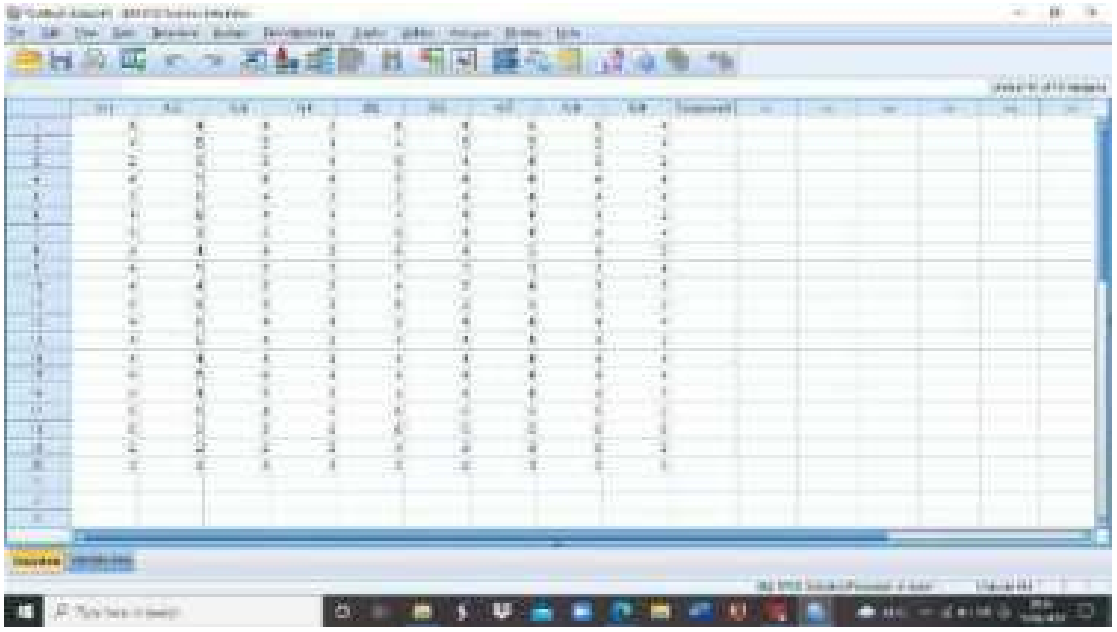
Agree(A)= 4
Doubtful(D)=3
Disagree(Ds)=2
Strongly Disagree(SD)=1

PRACTICE :Conducting a validity test for each item of the questionnaire on the perception variable regarding the Importance of Self-Efficiency.
2. Pearson Validity test steps with SPSS
INPUT-ANALYSIS -OUTPUT

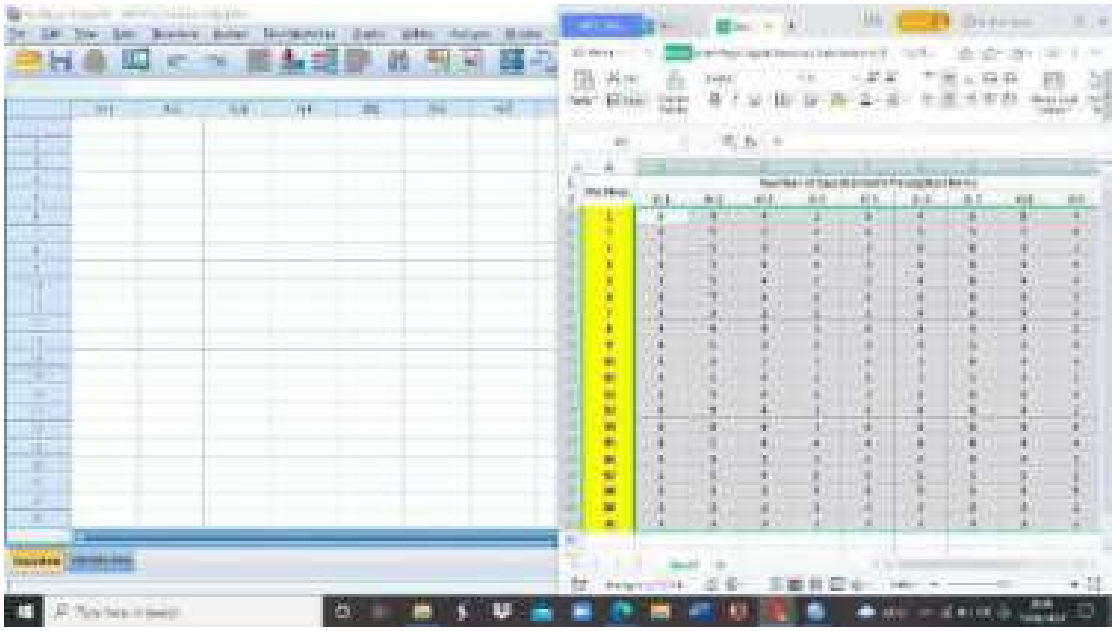
GO TO EXCEL- COPY AND PASTE XI 1 UNTIL XI 9 -PASTE IN SPSS

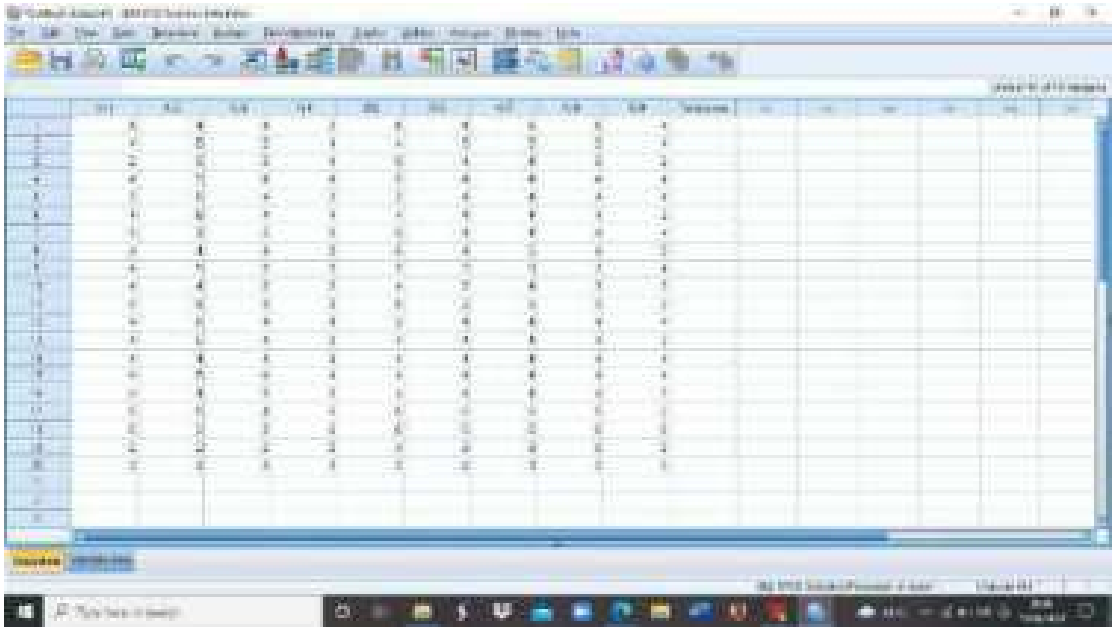


And then Go to DATA VIEW. GET READY THE DATA

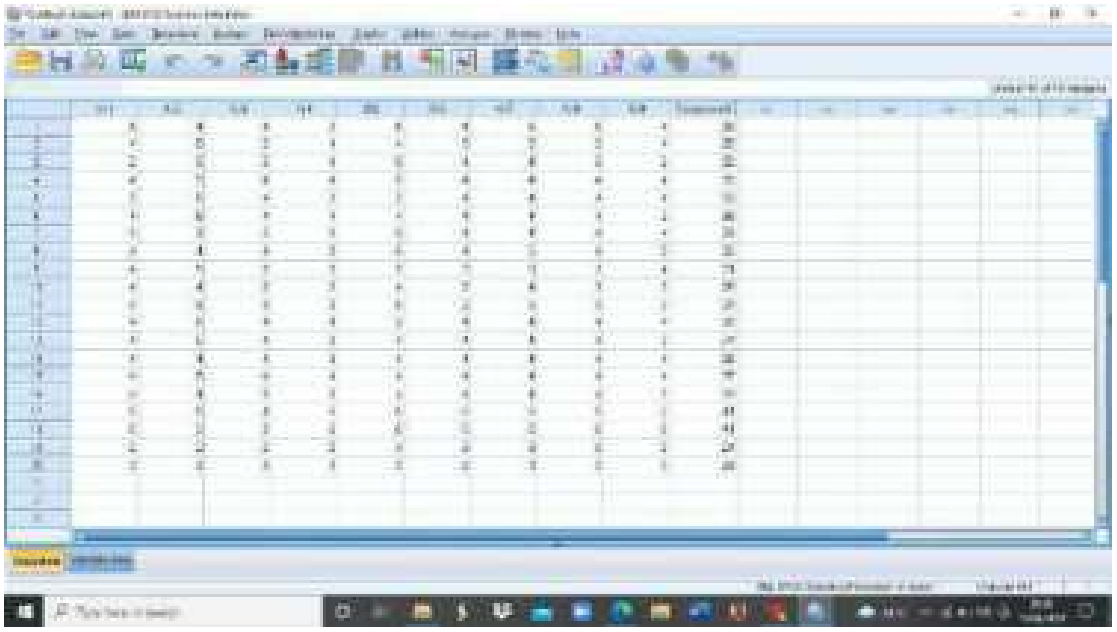


After that copy and paste the data from excel word to SPSS in DATA VIEW

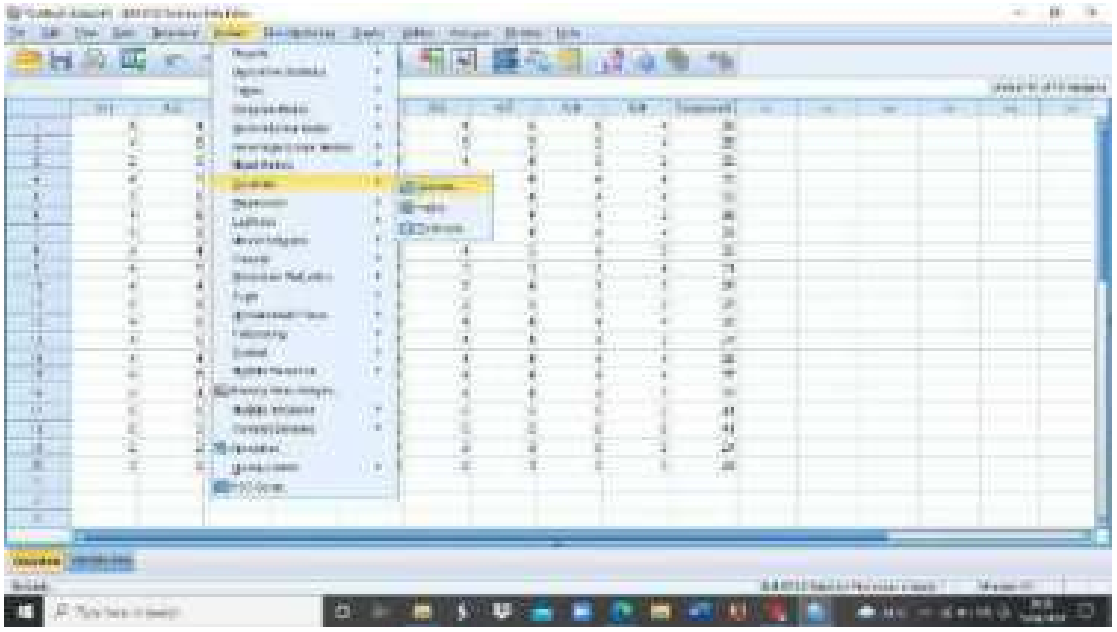




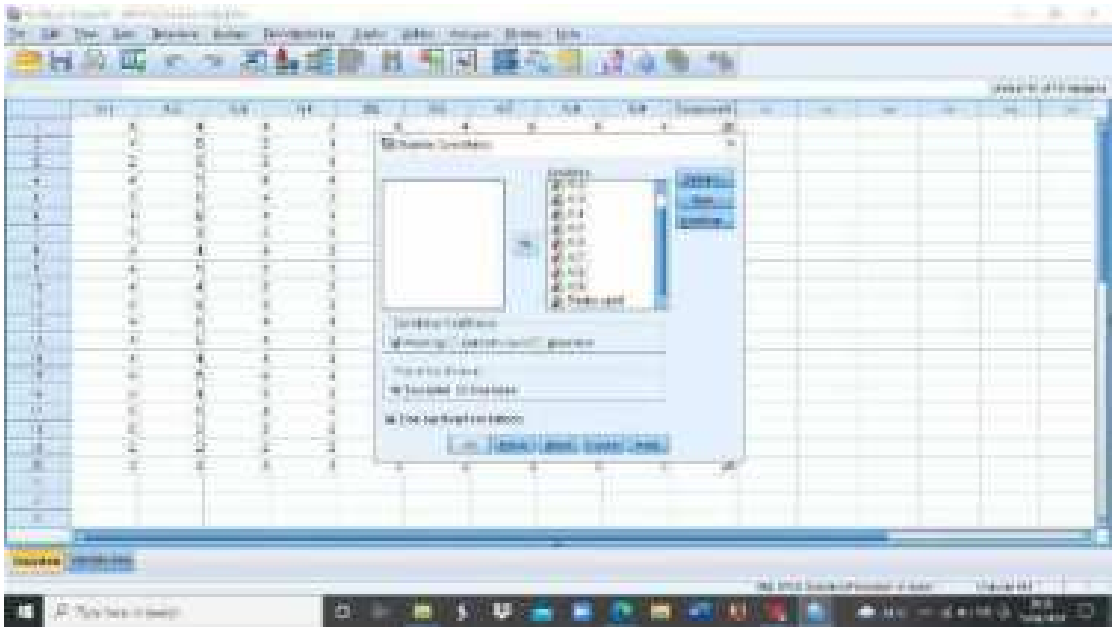
COPY AND PASTE THE TOTAL SCORE FROM EXCEL TO SPPSS.



And then , Go to ANALYZE - CORRELATE- BIVARIATE

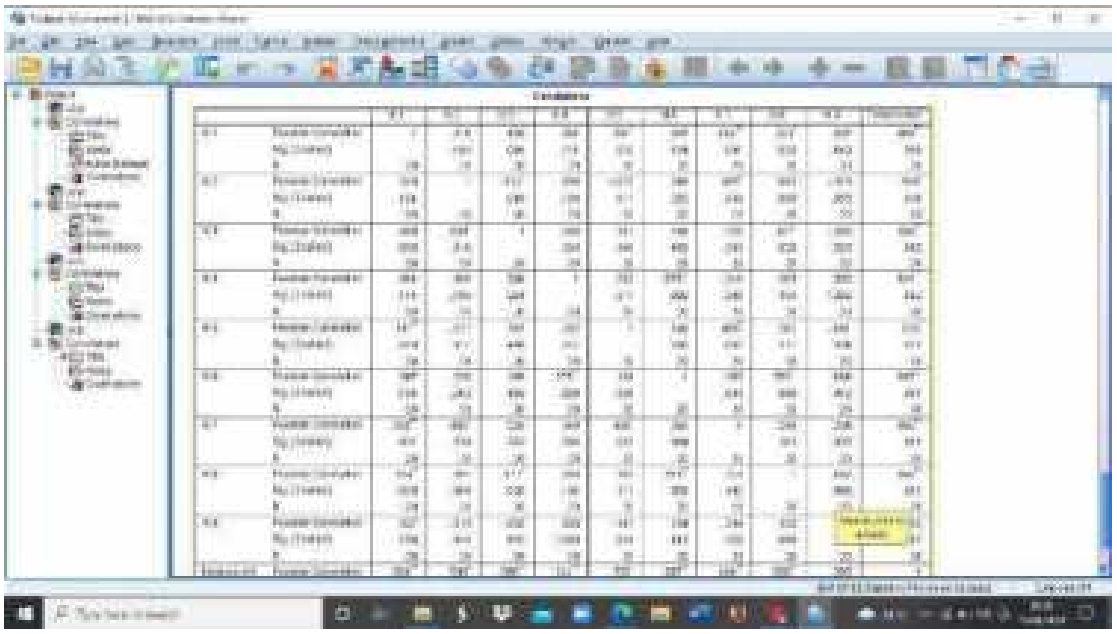


Move the XI .1-XI.9 and Total score to the right dialog box.



CLICK OK

OUTPUT



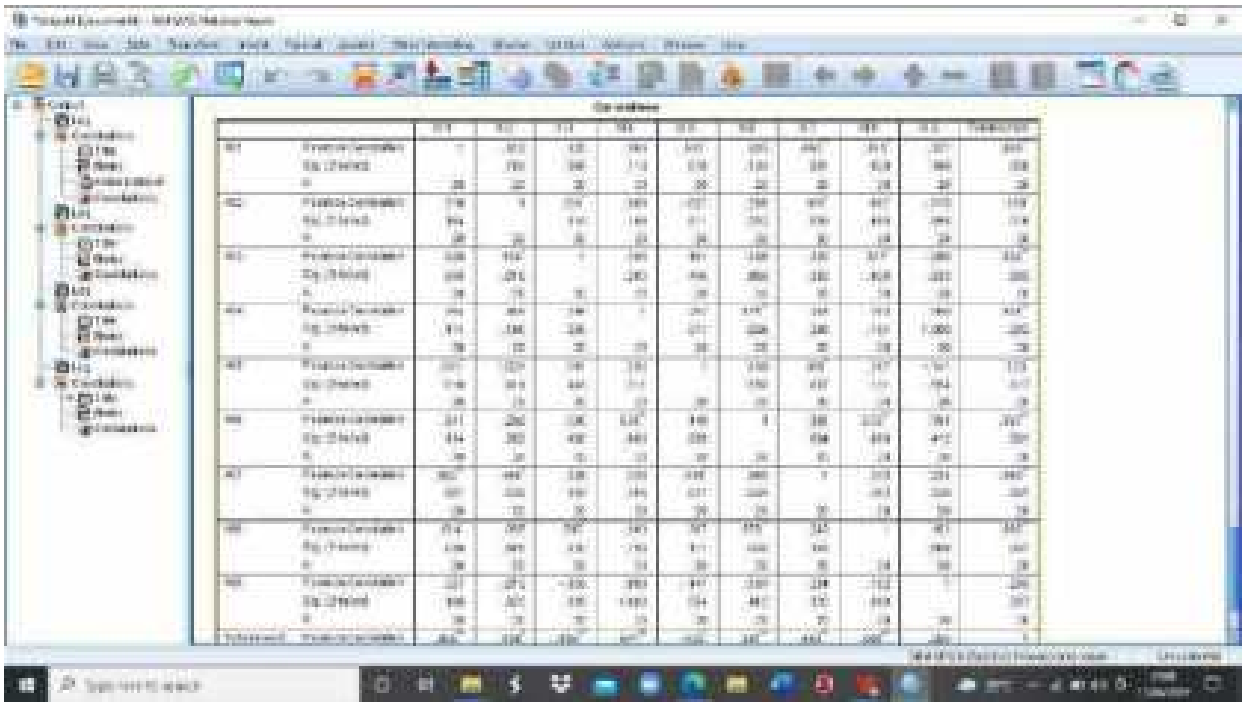
Basic decision making for pearson validity test

Comparing the value of recount with r table
1. if the value of recount >rtable=valid
2. If the value of recount <rtable=invalid.

The way to find the r table value with N-20 at 5%
Significance is to look at the distribution of the statistical rtable value.Based on the distribution of the statistical rtable value,the rtable value of 0,444 was obtained.

Taking the decision based on the result of the significance value (Sig)
1. If the significance value <0,05 =valid
2. If the significance value >0,05 =invalid.

Go to the output in SPSS



Person Validity test results summary

Item no.	rcount	rtable	Sig.	Criteria
1	0,808	0,444	0,000	valid
2	0,530	0,444	0,016	valid
3	0,598	0,444	0,005	valid
4	0,641	0,444	0,002	valid
5	0,525	0,444	0,017	valid
6	0,592	0,444	0,006	valid
7	0,689	0,444	0,001	valid
8	0,690	0,444	0,001	valid
9	0,295	0,444	0,207	Invalid

Pearson validity test question

1. there is a theory which states that the way to find rtable is N-2 ,so which one is correct ?
2. The rcount is negative,but the significance is <0,05,what is the conclusion?
3. How to deal with invalid questionnaire items ?
4. Can a questionnaire using true-false statements be tested for validity in this way ?

13. CRONBACH ALPHA RELIABILITY TEST FOR QUESTIONNAIRE WITH SPSS

CRONBACH ALPHA RELIABILITY TEST BASIC CONCEPTS

1. Research questionnaires are said to be of high quality if their validity and reliability have been proven.
2. The reliability test was carried out after the questionnaire items were declared valid.
3. The reliability test aims to see whether the questionnaire has consistency if the measurement is done with the questionnaire that is done repeatedly.
4. The reliability test can be carried out simultaneously on all questionnaire items in a research variable (Field, 2005; Garth, 2008; Jackson, 2009; Ostertagová & Ostertag, 2013; Rusydi & Fadhli, 2018; Singh, Kumar, 2006).

EXAMPLE OF CRONBACHALPHA RELIABILITY TEST CASE
RESEARCH TITLE: **"The Influence of Perceptions on the Teacher Students' Self-Efficacy toward the Improvement of Teaching Skills in Universitas PGRI Semarang in the Academic Year of 2022"**
PRACTICE: Conducting a reliability test for each item of the questionnaire on the Perception variable regarding the Importance of Self-Efficacy.

CRONBACH ALPHA RELIABILITY TEST STEPS

- **INPUT – ANALYSIS – OUTPUT**
- **PEARSON VALIDITY TEST RESULTS SUMMARY**

Item No.	rcount	rtable 5% (20)	Sig.	Criteria
1	0.808	0.444	0.000	Valid
2	0.530	0.444	0.016	Valid
3	0.598	0.444	0.005	Valid
4	0.641	0.444	0.002	Valid
5	0.525	0.444	0.017	Valid
6	0.592	0.444	0.006	Valid
7	0.689	0.444	0.001	Valid
8	0.690	0.444	0.001	Valid
9	0.295	0.444	0.207	Invalid

CRONBACH ALPHA RELIABILITY TEST BASIC ASSUMPTION

According to Wiratna Sujerweni (2014), the questionnaire is said to be reliable if the Cronbach alpha value is > 0.6
Pallant (2001) states Alpha Cronbach's
value above 0.6 is considered high reliability and acceptable index (Nunnally and Bernstein, 1994).

CRONBACH ALPHA RELIABILITY TEST QUESTIONS

1. What if the cronbach alpha is negative?
2. How to deal with unreliable questionnaires?
3. Is there a theory which states that if the Cronbach alpha value > rtable, then it is considered reliable?

TUTORIAL & PRACTICE_ CRONBACH ALPHA RELIABILITY TEST FOR QUESTIONNAIRE WITH SPSS

Research Title :''The Influence of Perceptions on the Teacher' Self-Efficacy toward the Improvement of Teaching Skills in Universitas PGRI Semarang in the Academic Year of 2022''

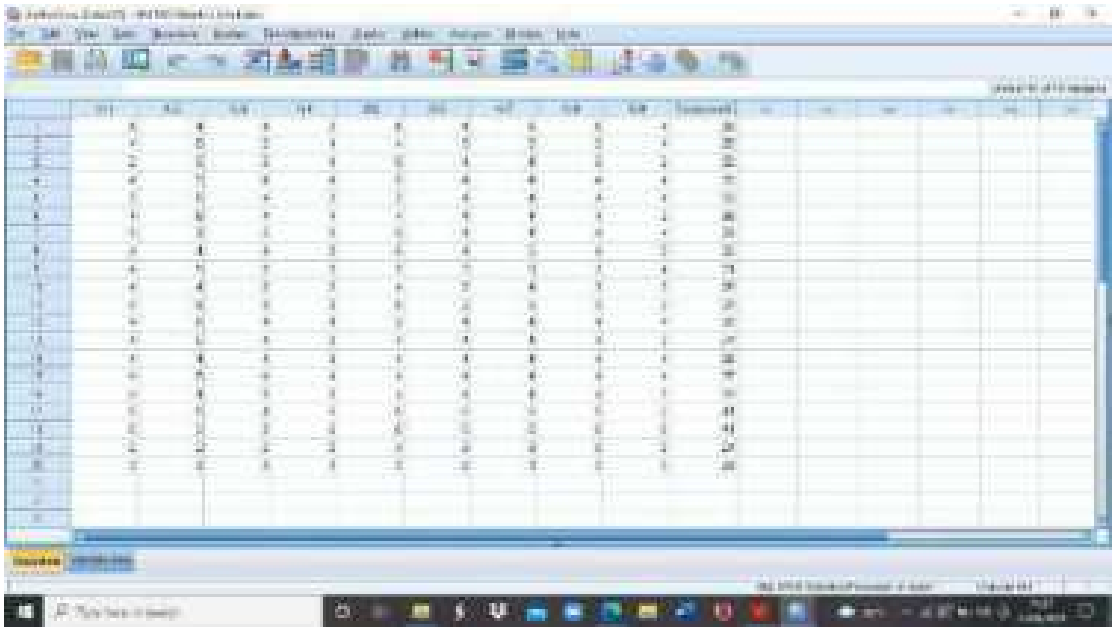
Practice :Conducting a reliability test for each item of the questionnaire on the Perception variable regarding the Importance of Self-Efficacy.

Steps:

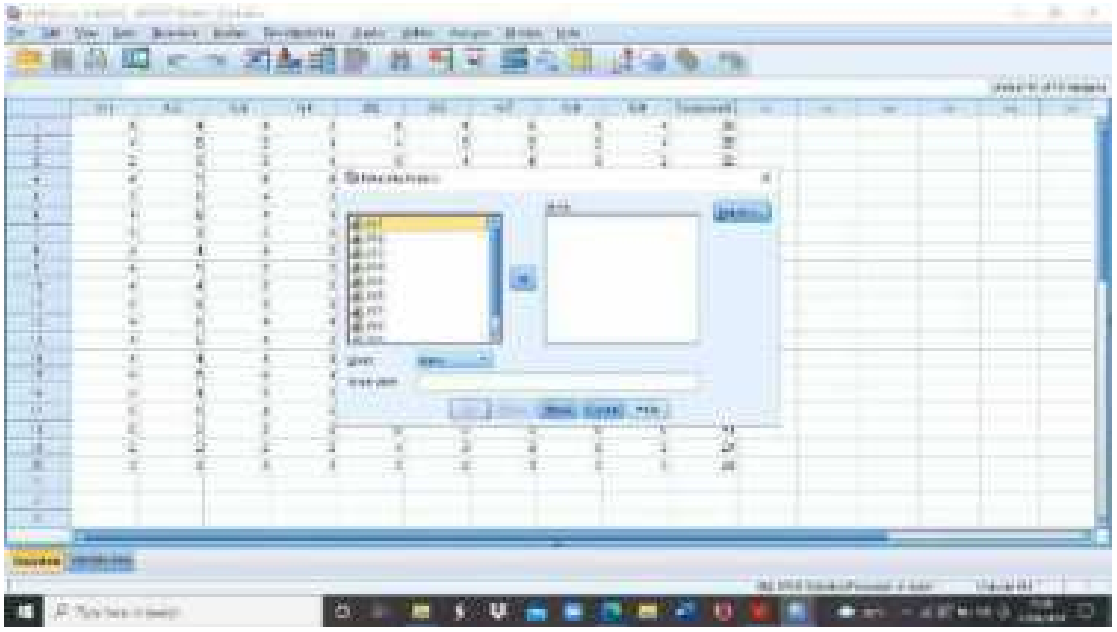
1. INPUT -ANALYSIS-OUTPUT
2. PEARSON VALIDITY TEST RESULTS

SUMMARY Open the Data view in SPSS from

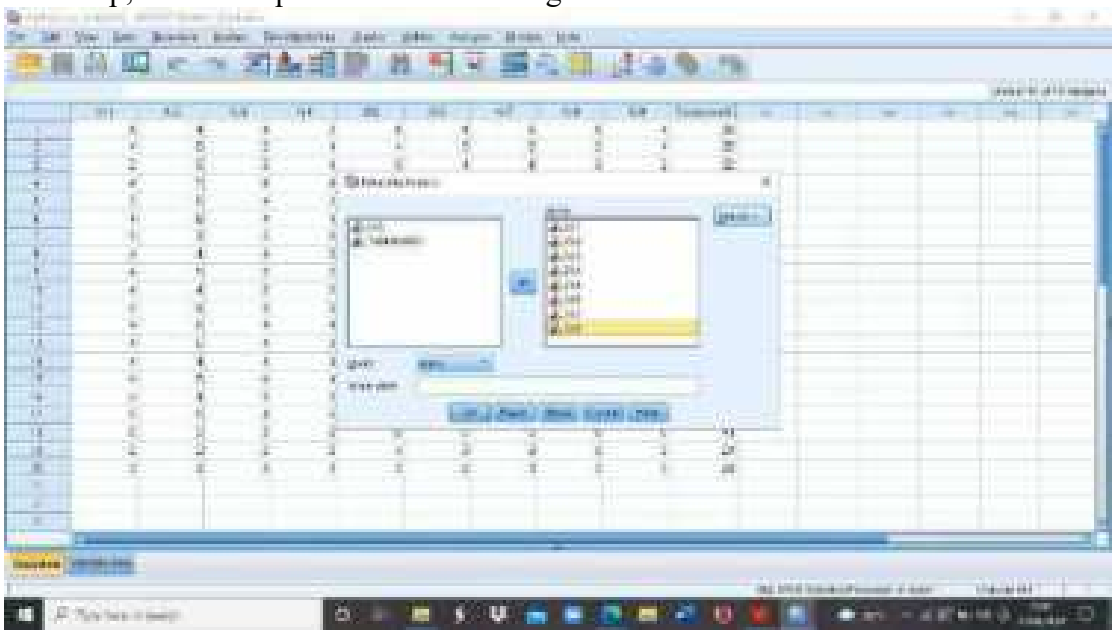
the data yesterday.



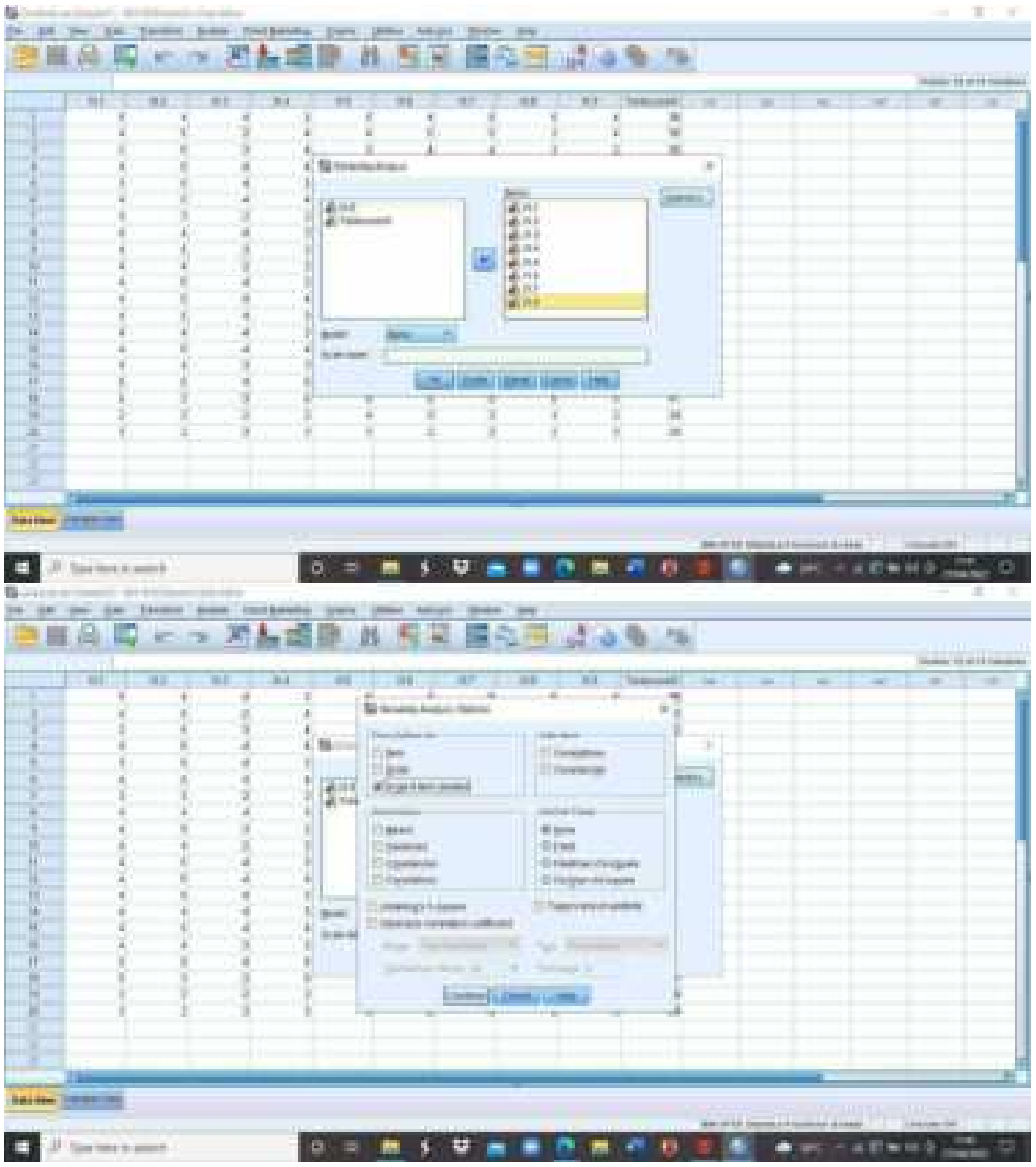
Go to ANALYZE -SCALE-CLICK RELIABILITY ANALYSIS.



Next step, move the questionnaire to the right .



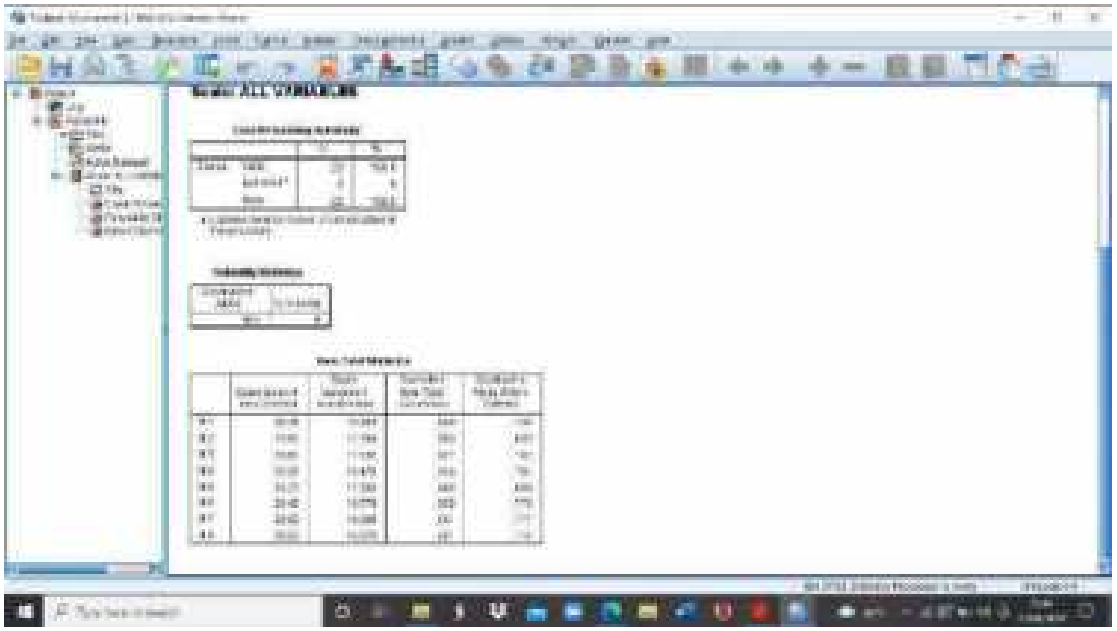
Then ,click statistic



Click scale if item deleted and click continue

There are 3 outputs :

Case processing summary
Reliability Statistic
Item Total Statistic



CRONBACH ALPHA RELIABILITY TEST BASIC ASSUMPTION :

According to Wiratna Sujerweni(2014),the questionnaire is said to be reliable if the Cronbach alpha value is >0,6.

Pallant (2001) states Alpha Cronbach's value above 0.6 is considered high reliability and acceptable
index (Nunnally and Bernstein,1994).

CRONBACH ALPHA RELIABILITY TEST QUESTIONS.

1. What is the cronbach alpha is negative ?
2. How to deal with unrealiable questionnaires?
3. Is there a theory which states that If the Cronbach alpha value >table ,then it is considered reliable?

Answer:

1. is the cronbach alpha is negative,but all of the items of the questionnaires are already decided considered positive(Valid).If items of Questionnaires are negative
Or not reable but valid /positive in validity test ,it cannot use in research analysis.

2.Need to construct new questionnaires ,make sure that the questionnaire easy to read and easy to follow so that, the respondent are able to think and to give the questionnaires.

3.There is view evidence that some researchers use this kind of theories that is used Cronbach Alpha value is more than 0.6 ,so the items of the questionnaire will be positive reliability.

14. N-GAIN SCORE TEST EXPERIMENT CLASS AND CONTROL CLASS DATA WITH SPSS

BASIC CONCEPTS OF N-GAIN SCORE TEST

1. Normalized gain (N-gain score) aims to determine the effectiveness of using a method in one group pretest-posttest design research and research using experiment and control groups.
2. Gain score is the difference between the posttest and pretest scores.
3. In a one-group pretest-posttest design study (experimental design), the N-gain score test can be used when there is a significant difference between the average pretest and post-test scores through the paired sample t-test.
4. While in the study using the experiment group and the control group, the N-gain score test can be used when there is a significant difference between the average posttest value of the experiment group and the posttest value of the control group through the independent sample t-tes (Everitt & Skrondal, 2006; Friedrich et al., 2017; Kim, 2017; Parthiban & Gajivaradhan, 2016; Singh, Kumar, 2006; Wilmot & Mansell, 2014)t.

FORMULA TO CALCULATE N-GAIN SCORE

$$N\ Gain\ Score = \frac{Posttest\ Score - Pretest\ Score}{Ideal\ Score - Pretest\ Score}$$

Description: Ideal Score is the maximum value (the highest) which can be obtained.

N-GAIN SCORE CATEGORIES

N-Gain Score	Category
G > 0.7	High
0.3 ≤ g ≤ 0.7	average
G < 0.3	low

Adapted from Melzer (2008)
Or

Percentage (%)	Category
< 40	Not effective
40 - 55	Less effective
56 - 75	Effective enough
> 76	Effective

Adapted from Hake, R.R (1999)

N-GAIN SCORE TEST CASE EXAMPLE

For example, we use the N-gain score test to determine the effectiveness of the use of cooperative learning methods on English learning outcomes in Recount Text material for the 11th-grade students of SMA-IT Al Fikri Semarang in the academic year 2022.

As for the pretest and post-test score data in the experiment class and control class, we can see in the following excel data.

STAGES OF N-GAIN SCORE TEST WITH SPSS

INPUT --> ANALYSIS --> OUTPUT

N-GAIN SCORE TEST INTERPRETATION

Referring to the N-gain value in the form of percent (%) and the descriptive output table, we can make a table of the results of the N-gain score test calculation below

N-Gain Score Test Calculation Results				
No.	**Experiment Class**		**No.**	**Control Class**
	N-Gain Score (%)			**N-Gain Score(%)**
1	65.71		**1**	31.03
2	55.56		**2**	30.00
3	69.05		**3**	47.73
4	75.00		**4**	36.36
5	59.46		**5**	6.25
6	66.67		**6**	41.46
7	66.67		**7**	9.68
8	62.16		**8**	10.00
9	53.13		**9**	6.06
10	61.11		**10**	30.00
11	62.86		**11**	35.71
Mean	**63.3969**		**Mean**	**25.8446**
Minimum	**53.13**		**Minimum**	**6.06**
Maximum	**75.00**		**Maximum**	**47.73**

- Based on the results of the calculation of the N-gain score test, it shows that the average value of the N-gain score for the experiment class (cooperative learning method) is 63.3969 or 63.3% is categorized as effective enough. With a minimum N-gain score of 53.13% and a maximum of 75%.
- Meanwhile, the average N-gain score for the control class (conventional learning method) is 25.8446 or 25.8% is included in the ineffective category. With a minimum N-gain score of 6.06% and a maximum of 47.73%.

- So it can be concluded that the use of cooperative learning methods is effective enough in improving English learning outcomes in Recount Text material for the 11th-grade students of SMA-IT Al Fikri Semarang in the 2022 academic year.
- Meanwhile, the use of conventional learning methods is not effective for improving English learning outcomes in Recount Text material for the 11th-grade students of SMA-IT Al Fikri Semarang in the 2022 academic year.

escriptives

	Class			Statistic	Std. Error
NGain_Score_Percentage	Experiment	Mean		63.3969	1.86562
		95% Confidence Interval for Mean	Lower Bound	59.2400	
			Upper Bound	67.5537	
		5% Trimmed Mean		63.3229	
		Median		62.8571	
		Variance		38.286	
		Std. Deviation		6.18756	
		Minimum		53.13	
		Maximum		75.00	
		Range		21.88	
		Interquartile Range		7.21	
		Skewness		.095	.661
		Kurtosis		.159	1.279
	Control	Mean		25.8446	4.55283
		95% Confidence Interval for Mean	Lower Bound	15.7003	
			Upper Bound	35.9890	
		5% Trimmed Mean		25.7281	
		Median		30.0000	
		Variance		228.011	
		Std. Deviation		15.10004	

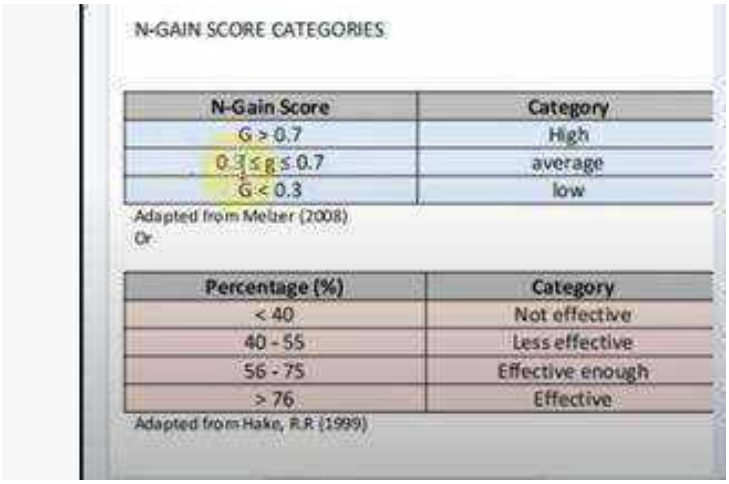
	Minimum	6.06	
	Maximum	47.73	
	Range	41.67	
	Interquartile Range	26.69	
	Skewness	-.240	.661
	Kurtosis	-1.544	1.279

14. N-GAIN SCORE TEST EXPERIMENT CLASS AND CONTROL CLASS DATA WITH SPSS

Basic Concepts of N-Gain Score Test:
1. Normalized gain (N-Gain score) aims to determine the effectiveness of using a method in one group pre test and post test design research and research using experiment and control groups.
2. Gain score is the difference between the post test and pre test scores.
3. In a one group pre test -post test design study (experimental design), the N gain score test can be used when there is a significant difference between the average pre test and post test scores through the paired sample t test.
4. While in the study using the experiment group and the control group, the N -gain score test can be used when there is a significant difference between the average post test value of the experiment group and the post test value of the control group through the independent sample t-test.

Formulated to Calculated N -Gain Score

$$\textit{N Gain Score} = \frac{\textit{Post test Score-Pretest Score}}{\textit{Ideal Score -Pretest Score}}$$


N-GAIN SCORE CATEGORIES

N-Gain Score	Category
G > 0.7	High
0.3 ≤ g ≤ 0.7	average
G < 0.3	low

Adapted from Melzer (2008)
Or

Percentage (%)	Category
< 40	Not effective
40 - 55	Less effective
56 - 75	Effective enough
> 76	Effective

Adapted from Hake, R.R (1999)

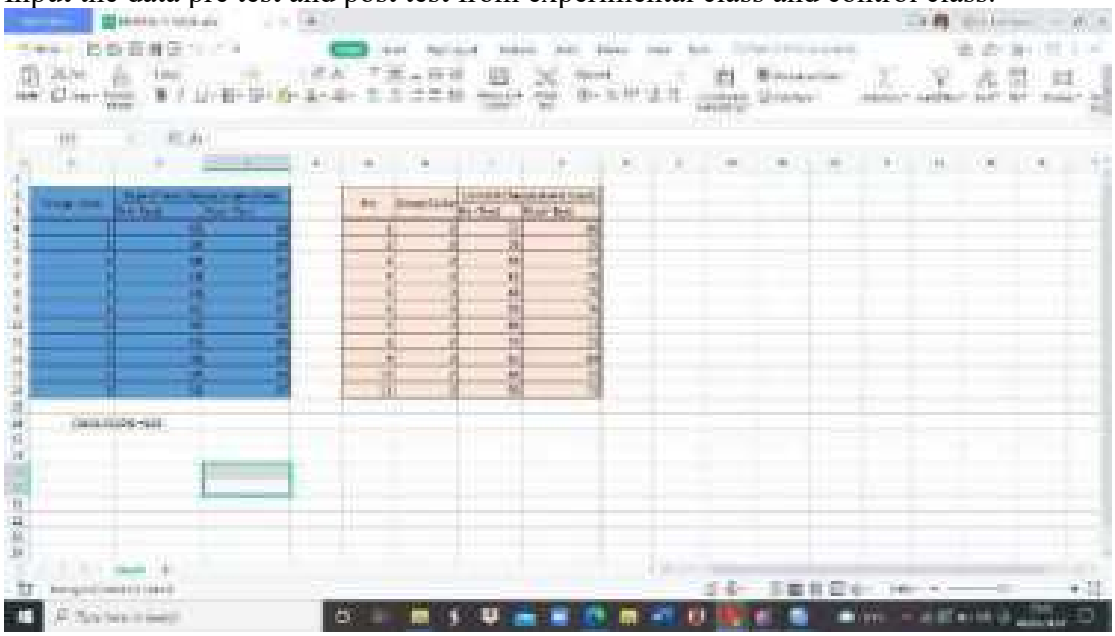
N-Gain Score Test Case Example
O-For Example, we use the N-gain score test to determine the effectiveness of the use of cooperative learning methods on English learning outcomes in Recount Text material for the 11th-grade students of SMA IT AL Fakri Semarang in the academic year 2022. As for the pretest and posttest score data in the experiment class and control class, we can see in the following excel data.

Stages of N -Gain Score Test with spss

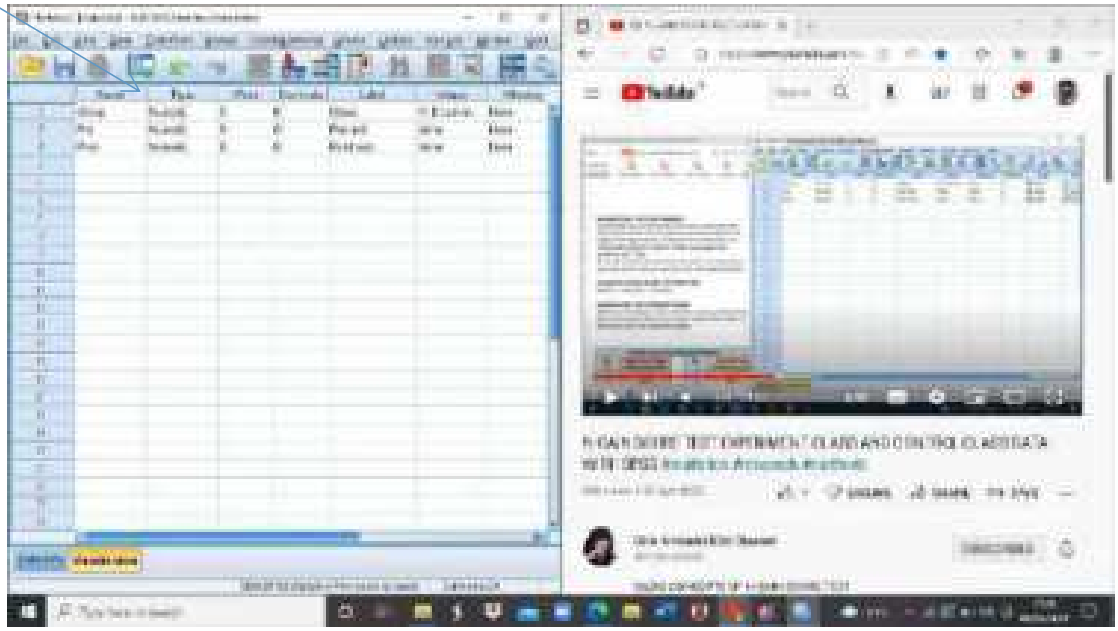
INPUT - ANALYSIS - OUTPUT

1. Open the excel word , type the data
2. Open the SPSS For Input

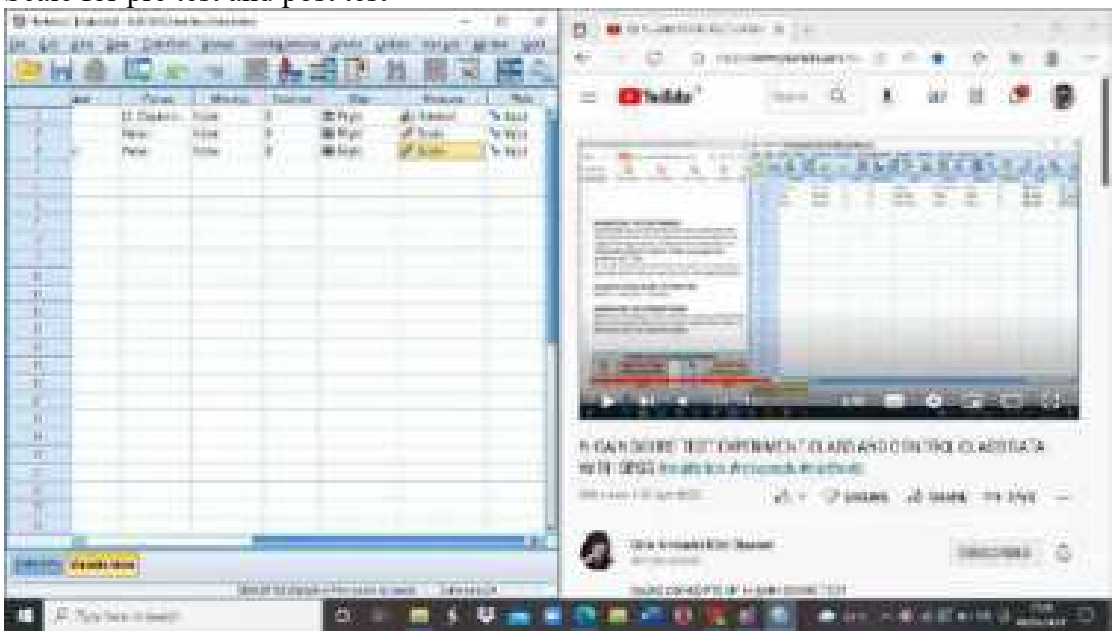
Input the data pre test and post test from experimental class and control class.



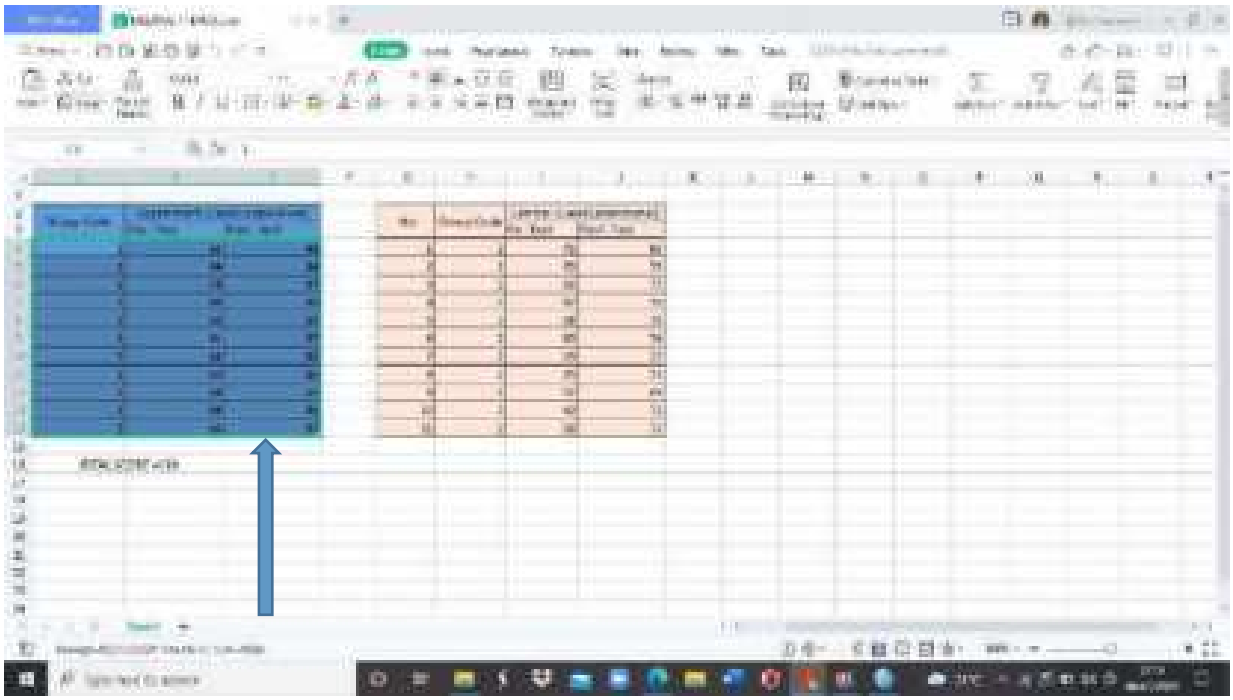
Go to the SPSS fill this type to the variable view.

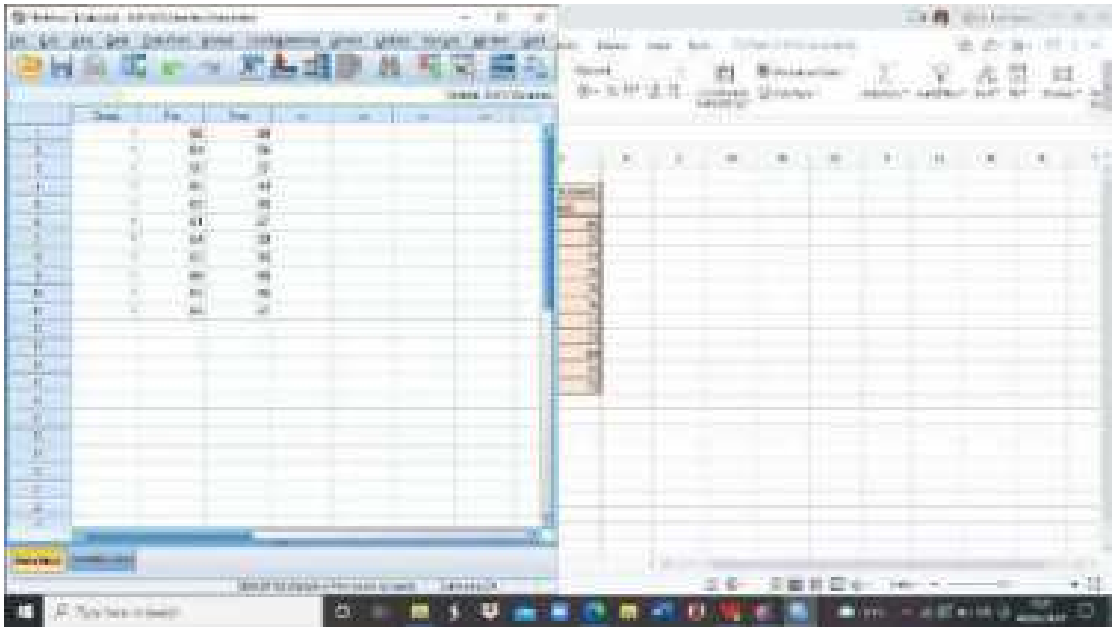


Click on measure column
Nominal for group
Scale for pre test and post test

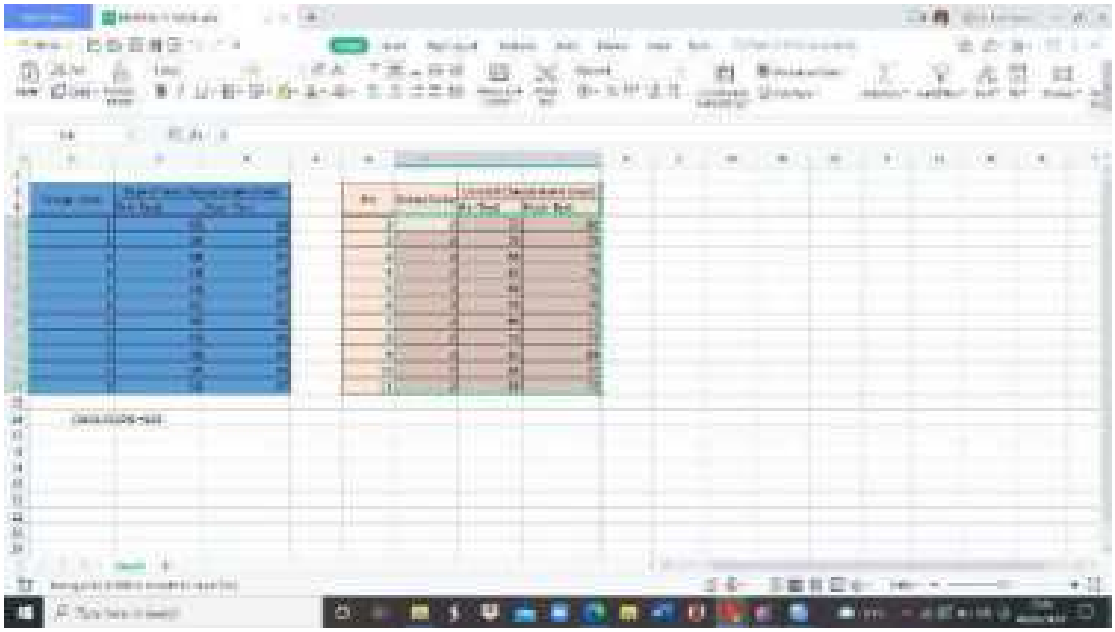


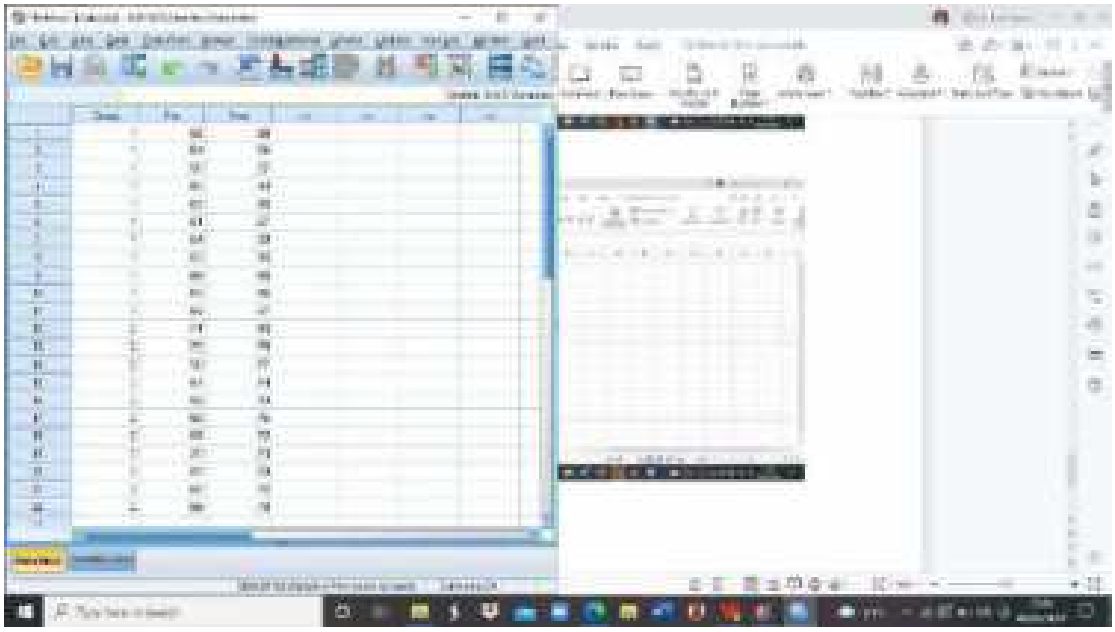
Go to excel data and Data view in SPSS
Copy and paste all the data In Experiment class



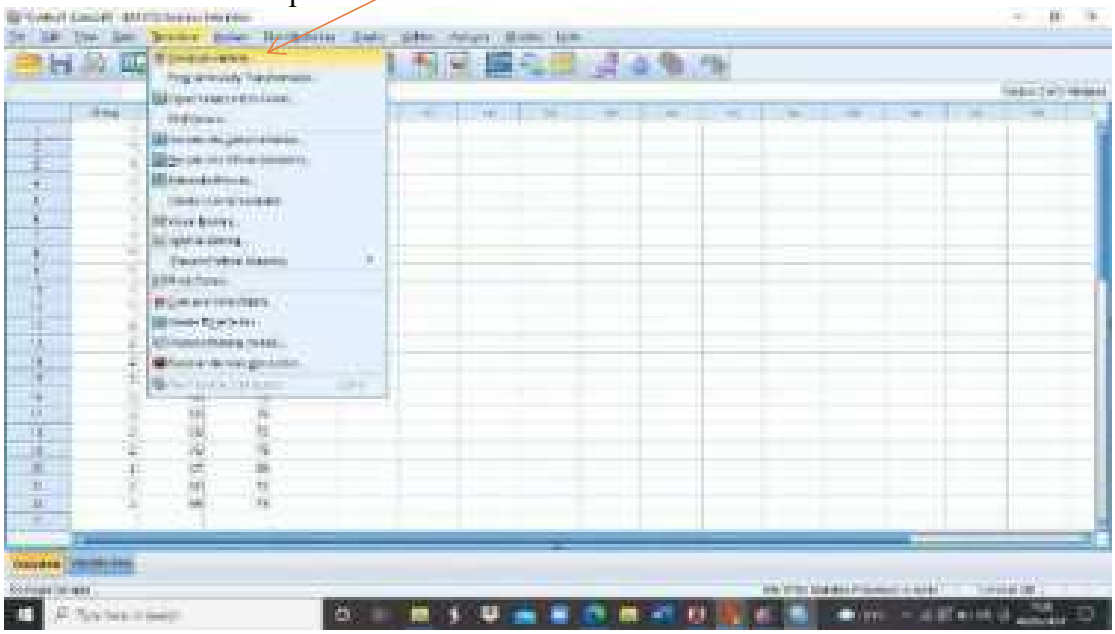


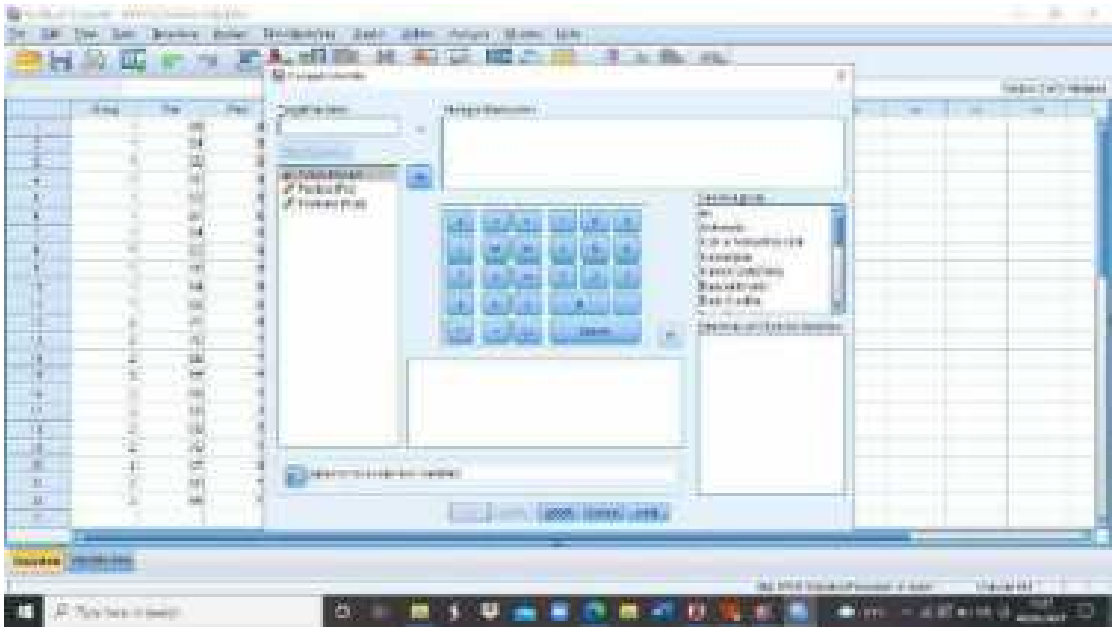
Copy and paste all the data from control class



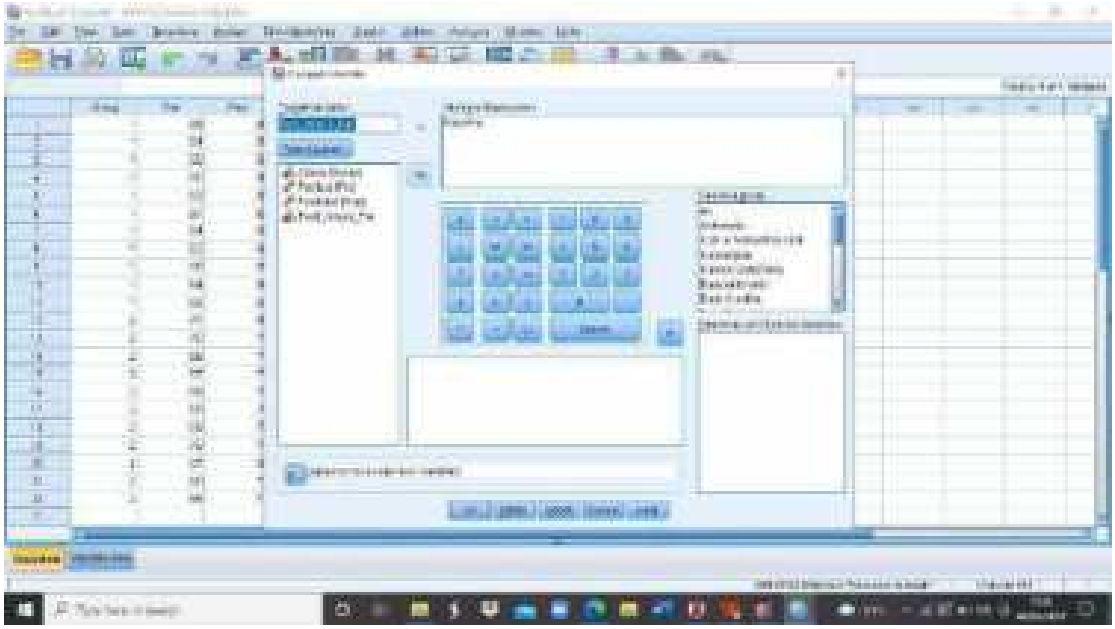


Go to SPSS
Click Transform-Compute Variable



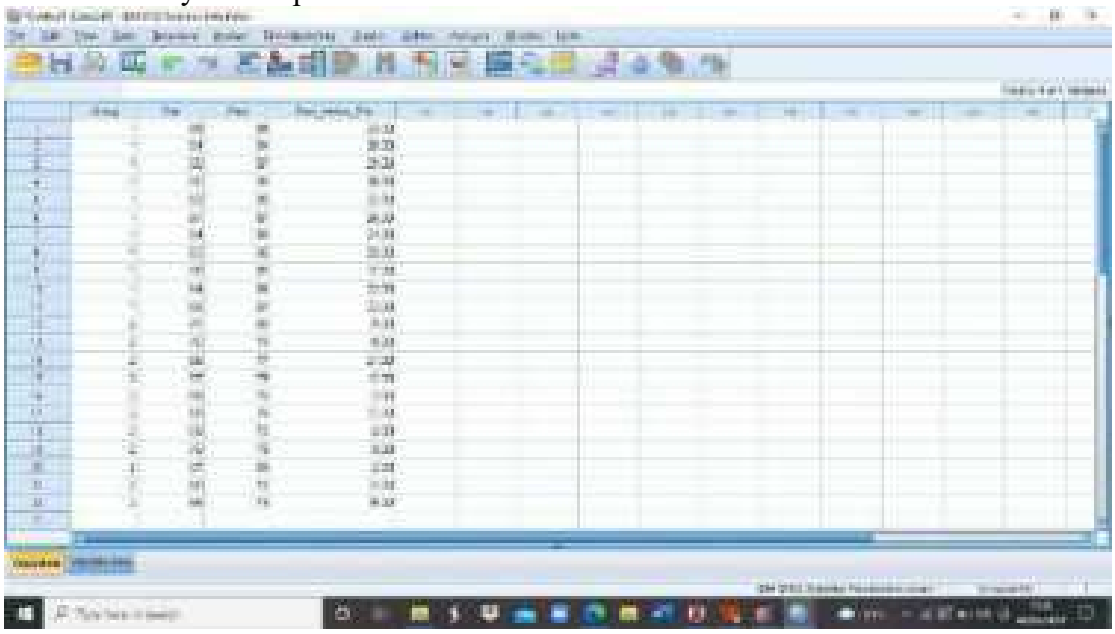


Type in target variable column
Post_minus_ Pre

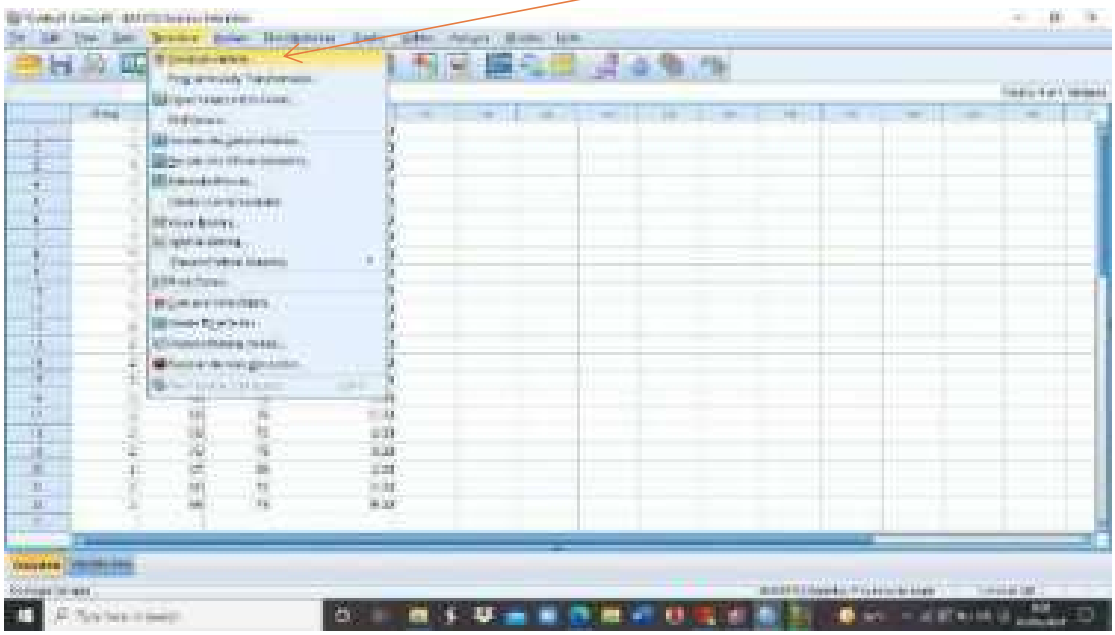


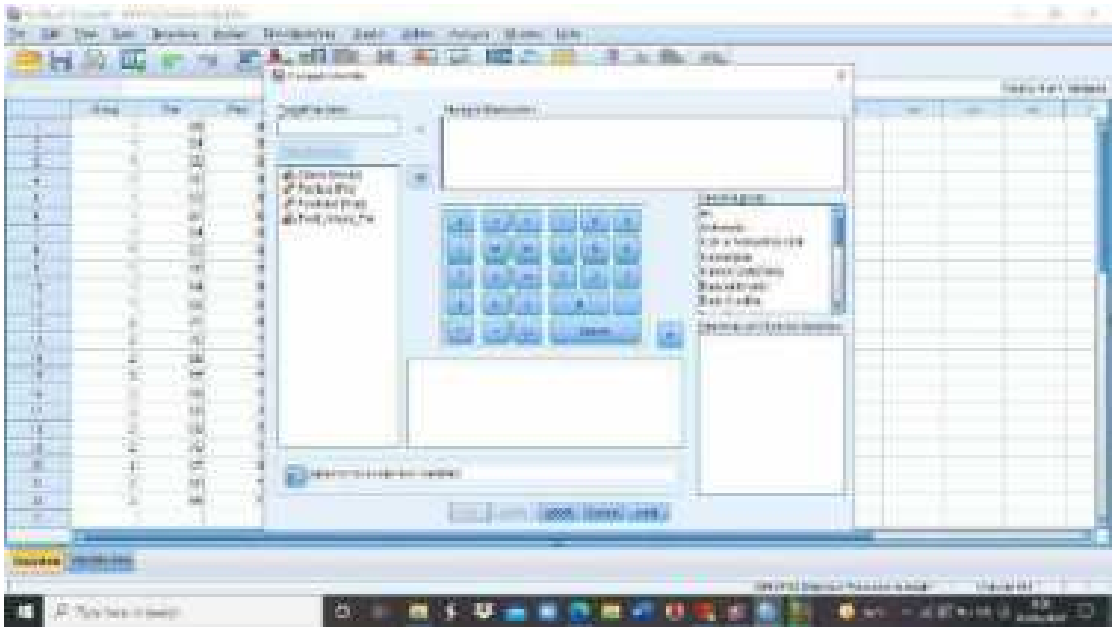
Then Click OK

That’s Already the output

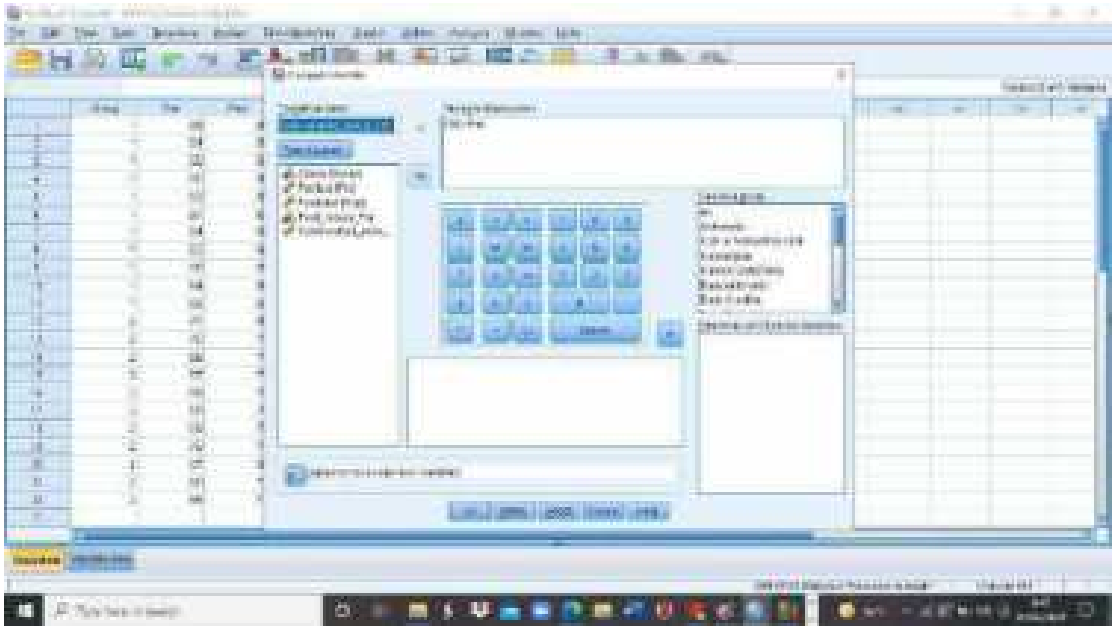


Click transform again and then compute Variable

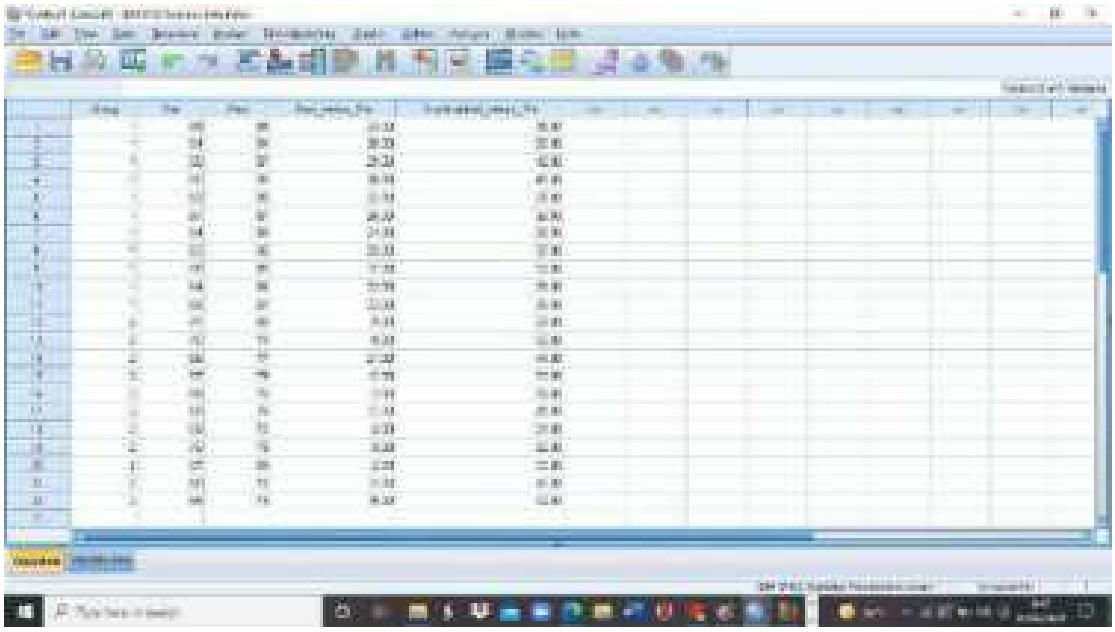




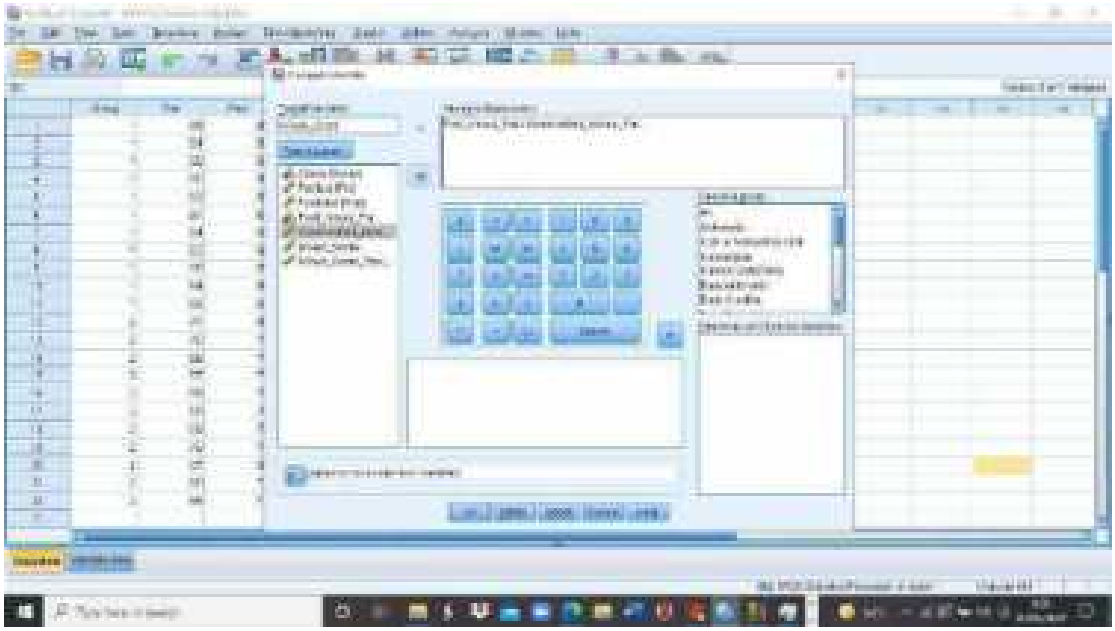
Type Onehundred_minus_pre



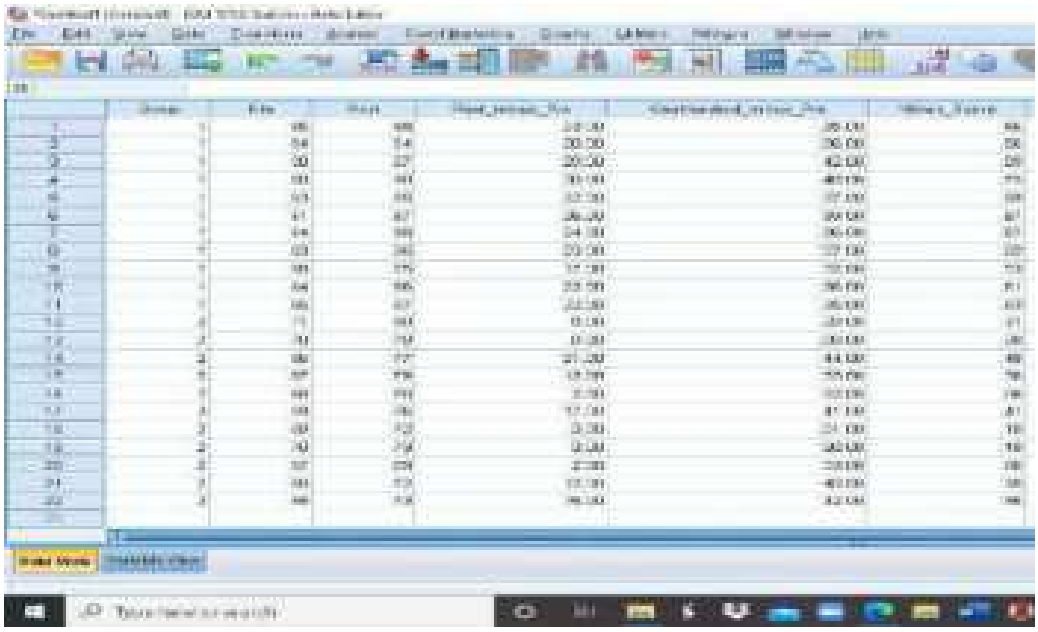
That is already the output OneHundred_minus_Pre

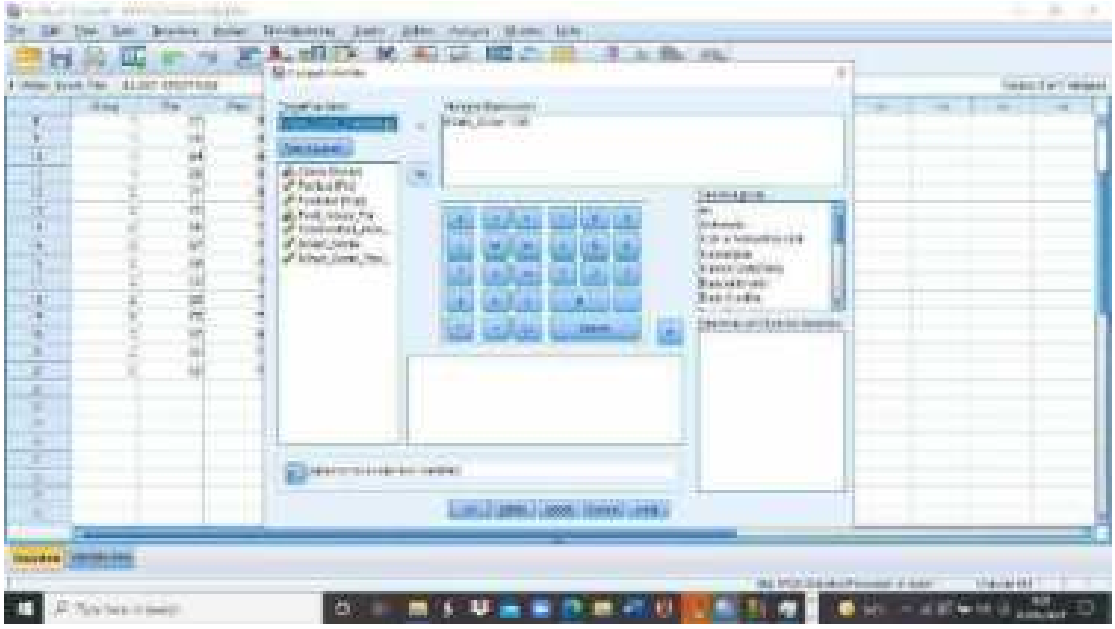


Next, type N-Gain _score

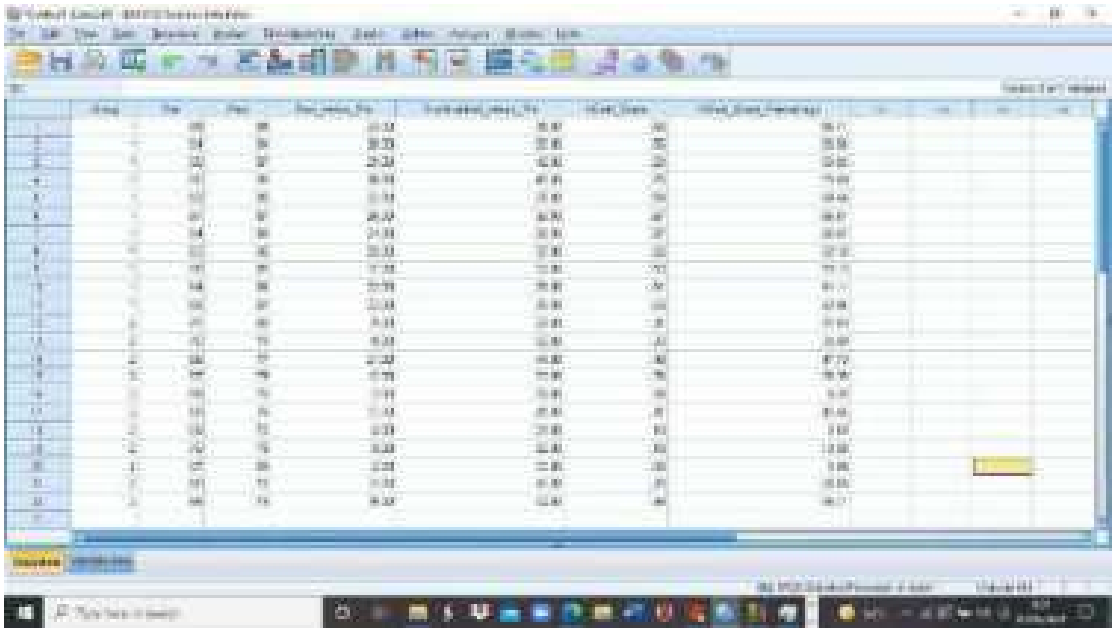


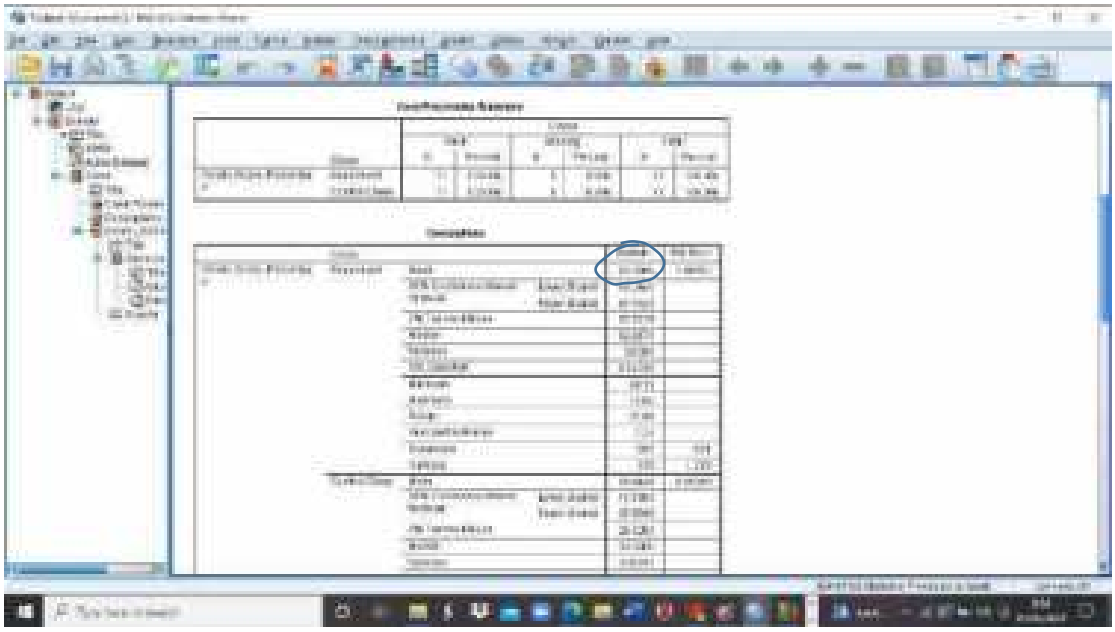
That is already the output of N-gain Score.

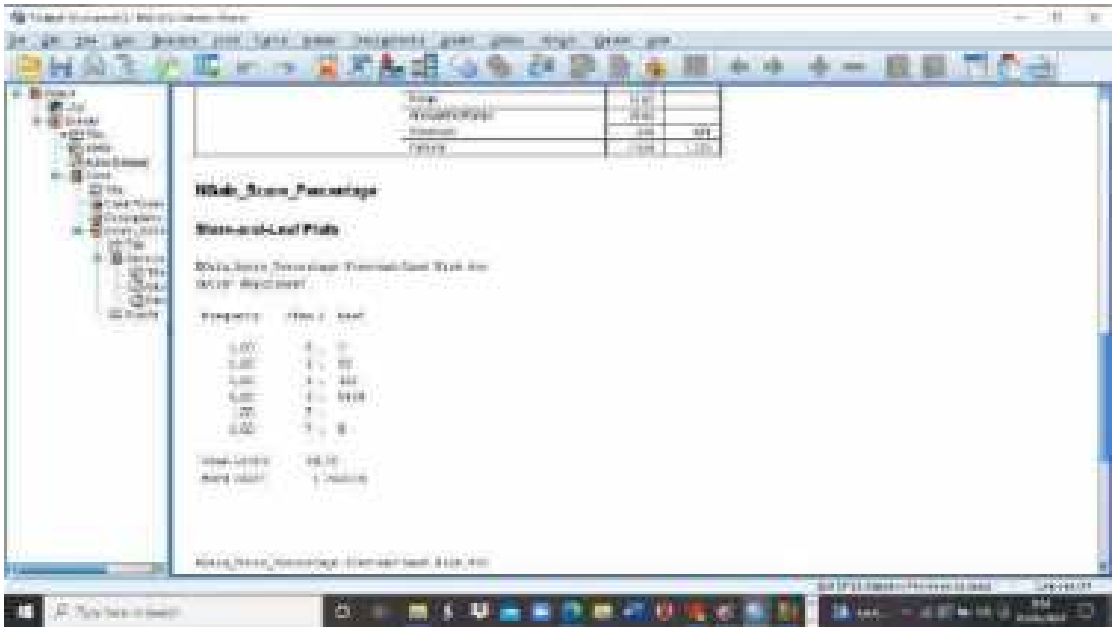




That is already the output N-Gain score of percentage







N-Gain Score Test Interpretation

Referring to the N -Gain value the form of of percent(%)and the descriptive output table,we can make a table of the results of the N-gain score test calculation below:
Get the N-Gain result from SPSS

N -Gain Score Test Calculation Results			
No.	Experiment Class	No.	Control Class
	N-Gain Score (%)		N-Gain Score(%)
1	65.71	1	31.03
2	55.56	2	30.00
3	69.05	3	47.73
4	75.00	4	36.36
5	59.46	5	6.25
6	66.67	6	41.46
7	66.67	7	9.68
8	62.16	8	10.00
9	53.13	9	6.06
10	61.11	10	30.00
11	62.86	11	35.71
Mean	63,39669	Mean	25.8446
Minimum	53,13	Minimum	6.06
Maximum	75,00	Median	47.73

Conclusion

1.Based on the results of the calculation pf the N-gain score test,it shows that the average value of the N-Gain score for the experiment class (cooperative learning method) is 63,3969 or 63.3 % is categorized as effective enough .With a minimum N-Gain score of 53.13 % and a maximum of 75 %.

2.Meanwhile ,the average N-gain score for the control class(conventional learning method)is 25.8446 or 25.8% is included in the ineffective category ,with a minimum N-gain score of 6,06 % and a maximum of 47,73 %.

3. So.it can concluded that the use of cooperative learning method is effective enough in improving English learning students in Recount Text material for the 11th grade students of SMA IT Al Fikri Semarang in the 2022 academic year.
4. Meanwhile ,the use of conventional learning method is not effective for improving English learning outcomes in Recount Text material for the 11th grade students of SMA IT Al Fikri Semarang in the 2022 academic year.

15. INDEPENDENT SAMPLE T TEST FOR N-GAIN SCORE WITH SPSS

BASIC CONCEPTS OF INDEPENDENT SAMPLE T TEST

1. Independent Sample t test is part of the parametric statistical analysis used to test whether there is a difference in the mean scores of two groups of unpaired data.
2. The type of data used in this test is in the form of interval or ratio scale data.
3. The requirements for using this test are data with normal distribution and homogeneous variance (not absolute requirements)
4. If one or both of the data are not normally distributed, then test the hypothesis using a non-parametric statistical test with the Mann-Whitney u test (Everitt & Skrondal, 2006; Field, 2005; Garth, 2008; Oliver-Rodríguez & Wang, 2015; Wilmot & Mansell, 2014).

EXAMPLE OF INDEPENDENT SAMPLE T TEST CASE FOR N-GAIN SCORE

- After previously knowing the effectiveness of the use of cooperative learning methods (experimental group) and conventional learning methods (control group) on English student learning outcomes, through the interpretation of the average value of the N-gain score (%).
- Next, we will compare whether there is a (significant) difference regarding the effectiveness of using cooperative learning methods with conventional learning methods in improving English learning outcomes in Recount Text material for the 11th-grade students of SMA-IT Al Fikri Semarang in the academic year 2022 using independent sample t-test techniques for N-gain score (%).

INDEPENDENT SAMPLE T TEST STAGES FOR N-GAIN SCORE

Open the SPSS file entitled " N-Gain Score.sav" which you have earlier. Next, we can go further to this video ANALYSIS (normality test, homogeneity test, and Independent sample t test OUTPUT.

BASIC DECISION OF THE SHAPIRO WILK NORMALITY TEST

1. If the value of Sig. > 0.05 then the data is normally distributed.
2. If the value of Sig. <0.05 then the data is not normally distributed.

Note: the Shapiro Wilk normality test was chosen, because the number of samples (N) used for both classes was less than 50 participants. Meanwhile, if the sample that we use in the study is more than 50, the normality test is carried out with reference to the Sig value. Kolmogorov Smirnov test.

Tests of Normality

	Class	Kolmogorov-Smirnov[a]	Shapiro-Wilk

		Statistic	df	Sig.	Statistic	df	Sig.
NGain_Score_Percentage	Experiment	.117	11	.200*	.983	11	.979
	Control	.245	11	.064	.880	11	.104

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

INTERPRETATION OF INDEPENDENT SAMPLE T TEST FOR N-GAIN SCORE WITH SPSS

First output table "Group Statistics"

Before we interpret the meaning of the output table, we first need to look at the categorization of the interpretation of the effectiveness of the N-Gain (%). Such as the following.

Percentage (%)	Category
< 40	Not effective
40 - 55	Less effective
56 - 75	Effective enough
> 76	Effective

- Based on the Group Statistics output table, it is known that the Mean NGain_Persentage score for the Experimental Class is 63.3969 or 63.4%. Based on the category table for the interpretation of the effectiveness of the N-Gain score (%), it can be concluded that the use of cooperative learning methods (in the experimental class) is effective enough in improving student learning outcomes.
- Furthermore, it is known that the Mean NGain_Pesentage score for the Control Class is 25.8446 or 25.8%. So based on the category table for the interpretation of the effectiveness of the N-Gain score(%), it can be concluded that the use of conventional learning methods (in the control class) is not effective in improving student learning outcomes.

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
NGain_Score_Percentage	Experiment	11	63.3969	6.18756	1.86562
	Control	11	25.8446	15.10004	4.55283

- So statistically descriptive, it can be said that there are differences in the effectiveness of implementing cooperative learning methods with conventional learning methods in improving student learning outcomes.

Next, to find out whether the difference in the effectiveness of the two methods is significant or not, the method is to interpret the second output table "Independent Sample t Test".

- Based on the output table, it is known the value of Sig. on Levene's Test for Equality of Variances is 0.002 < 0.05, it can be concluded that the variance of the N-Gain Score (%) for the experimental class and control class data is not homogeneous. Thus, the independent sample t-test for the n-gain score is guided by the value of Sig. contained in the table Equal variances not assumed.
- Based on the "Independent Samples t Test" output table, it is known that the value of Sig. (2-tailed) is 0.000 < 0.05, thus it can be concluded that there is a significant difference in effectiveness between the use of cooperative learning methods and conventional learning methods to improve English learning outcomes in Recount Text material for the 11th-grade students of SMA-IT Al Fikri Semarang in the academic year 2022.

Independent Samples Test

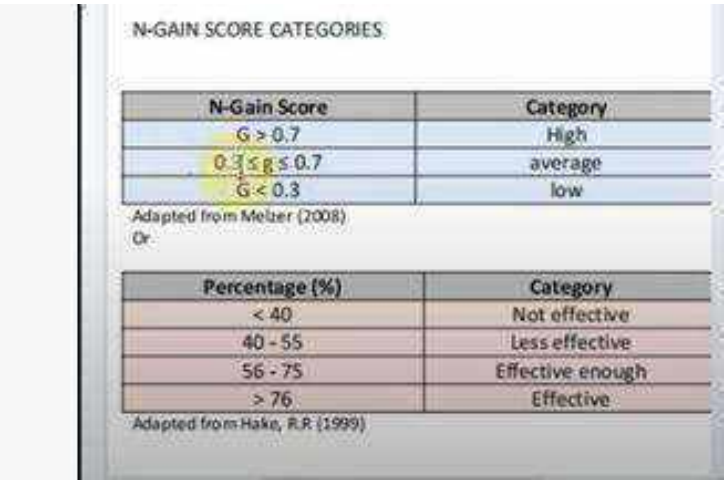
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
NGain_Score_Percentage	Equal variances assumed	13.272	.002	7.632	20	.000	37.55223	4.92025	27.28878	47.81569
	Equal variances not assumed			7.632	13.266	.000	37.55223	4.92025	26.94432	48.16014

SPSS TUTORIAL & PRACTICE

INDEPENDENT SAMPLE T TEST FOR N-GAIN SCORE WITH SPSS: Normality Test, Homogeneity Test

Before The Interpretation meaning of the output table,

first need of the effectiveness of the N Gain (%). Such as the following :



The Basic Concept of Independent Sample T Test :

1. Independent Sample t test is part of the parametric statistical analysis used to test whether there is a difference in the mean scores of two groups of unpaired data.

2. The Type of data used in this test is in the form of interval or ratio scale data.

3. The Requirements for using this test are data with normal distribution and homogeneous variance (not absolute requirements).

4. If one or both of the data are not Normally distributed,then test the hypothesis using non-parametric statistical test with the Mann-Whitney u test.

Example of Independent sample t test case for n gain score

- After previously knowing the effectiveness of the use of cooperative learning methods.(experimental group) and conventional learning methods(control group) on English student learning outcomes ,through the interpretation of the average value of the N -gain score (%).

- Next, we will compare whether there is a (significant)difference regarding the effectiveness of using cooperative learning methods with conventional learning methods in improving English outcomes in Recount Text material for the 11 th grade students of SMA IT Al Fikri Semarang in the academic year 2022 using I**ndependent sample t test technique for N - Gain score(%).**

Independent sample t test stages for N-Gain score

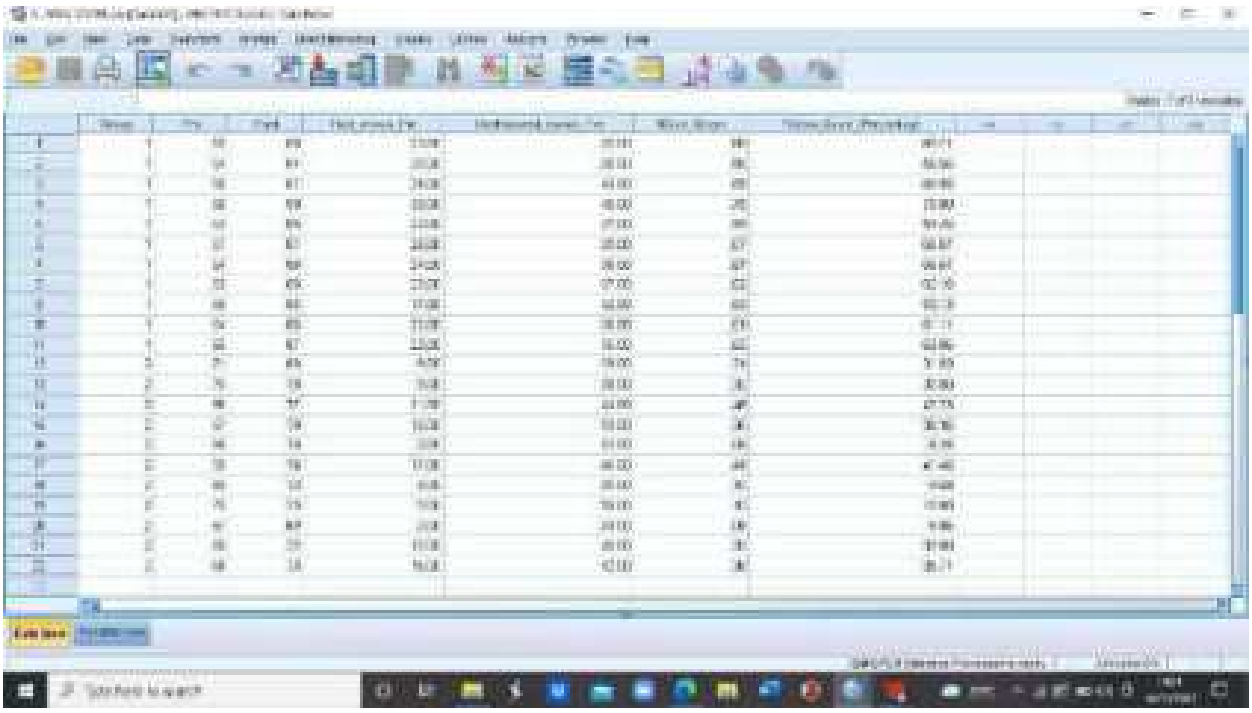
Open the SPSS file entittled'' N -gain score.sav'' which you have earlier . Next ,we can go further to this video analysis (normality test, homogeneity test, and independent sample t test OUTPUT).

Basic Decision of the Shapiro Wilk Normality Test

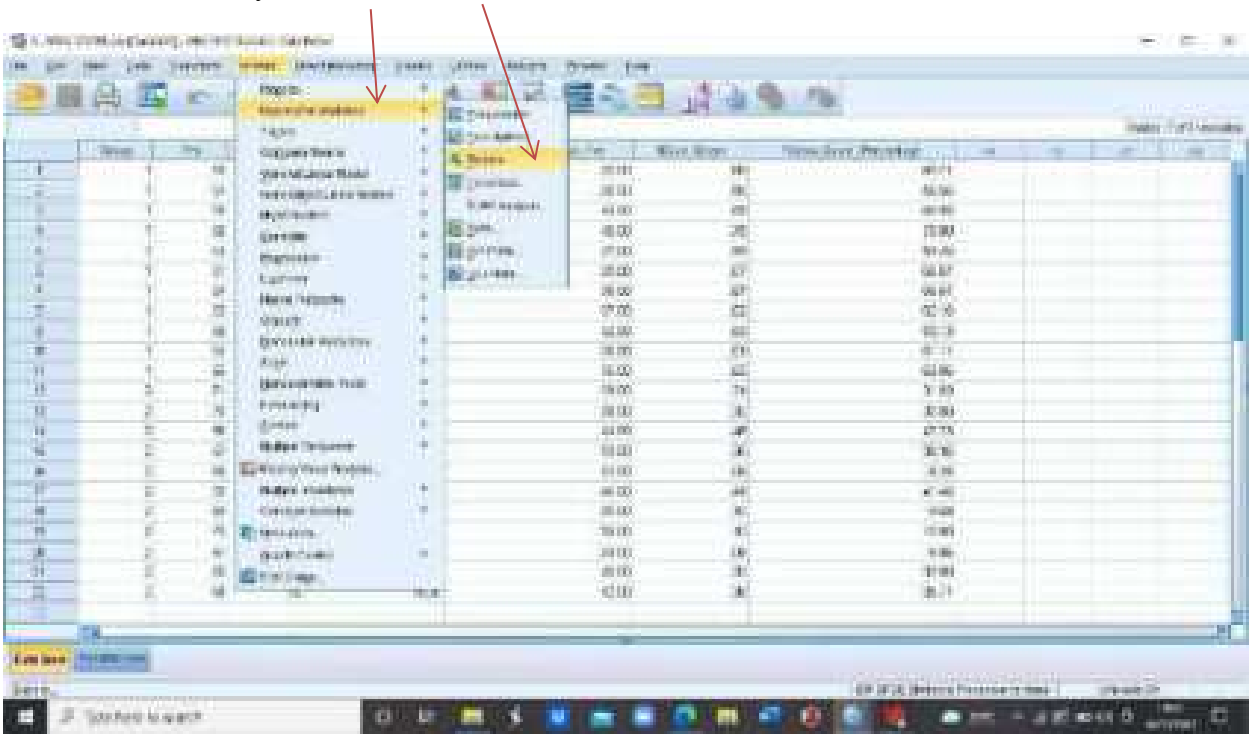
1. If the value of Sig.>0.05 then, the data is normally distributed.
2. If the value of Sig.<0.05 then the data is not normally distributed.

Note :The **Saphiro Wilk** Normality test was chosen,because the number of samples (N)used for both classes was less than 50 participants.Meanwhile , if the sample that we use in the study is more than 50, the normality test is carried out with reference to the Sig.Value.Kolmogorov Smirnov test.

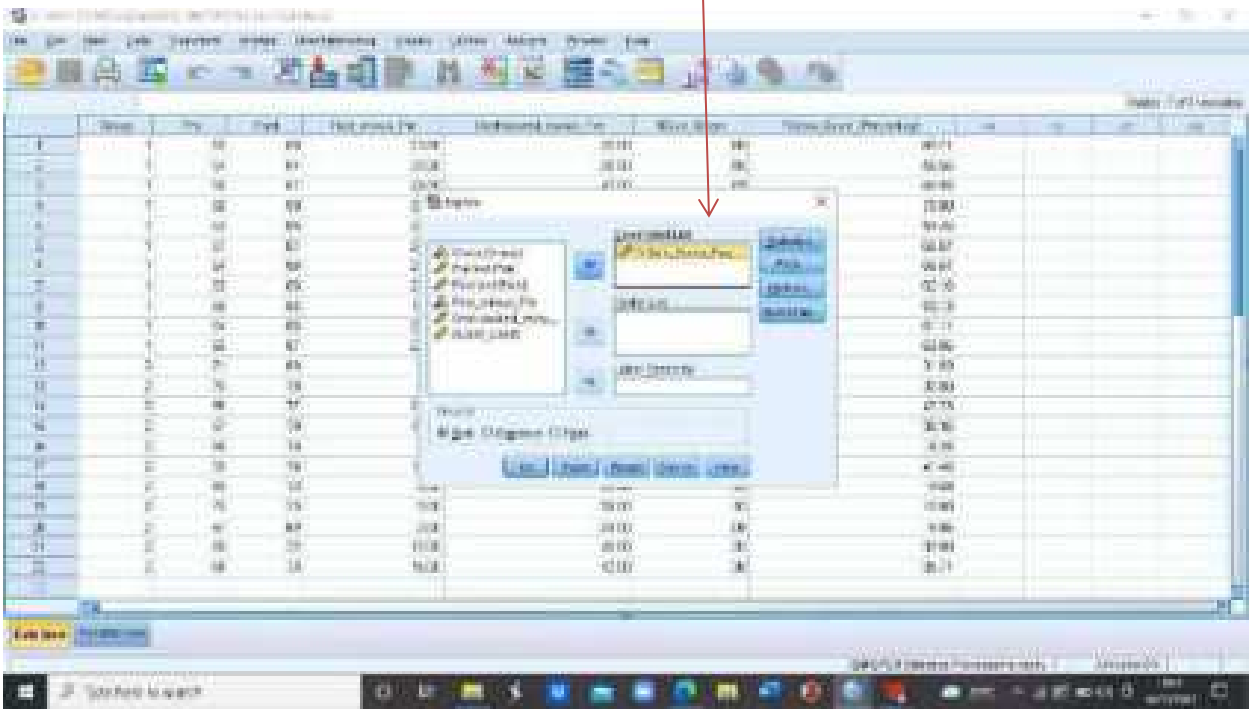
We take the data from N gain score , From the previous meeting .



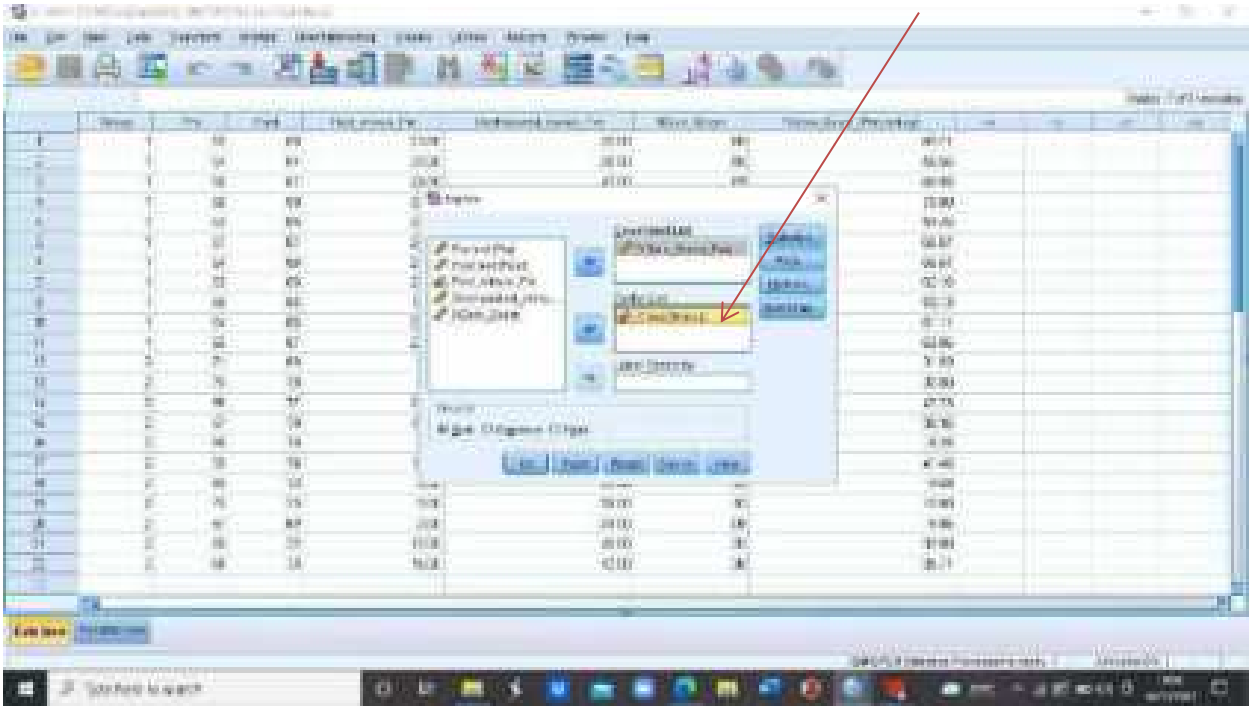
Check the Normality test



Move the N-Gain score percentage to the right side in DEPENDENT LIST BOX.

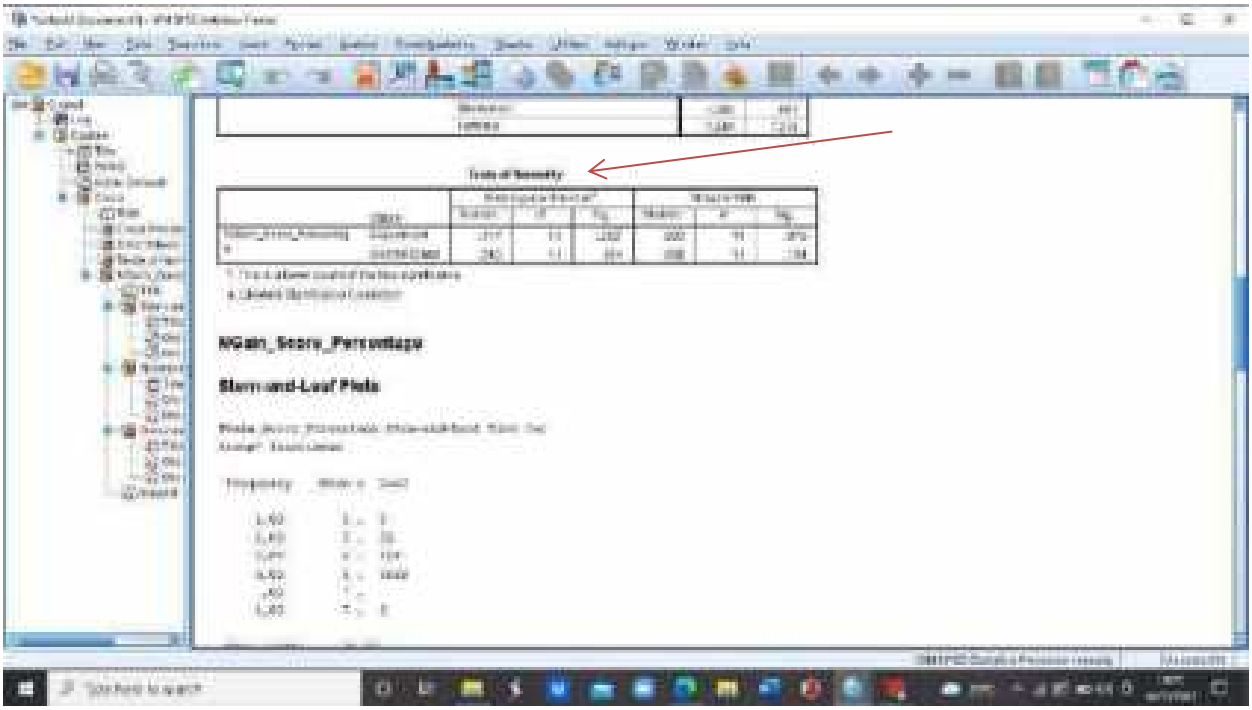


Move the class (Group) to the right side on the FACTOR LIST BOX.



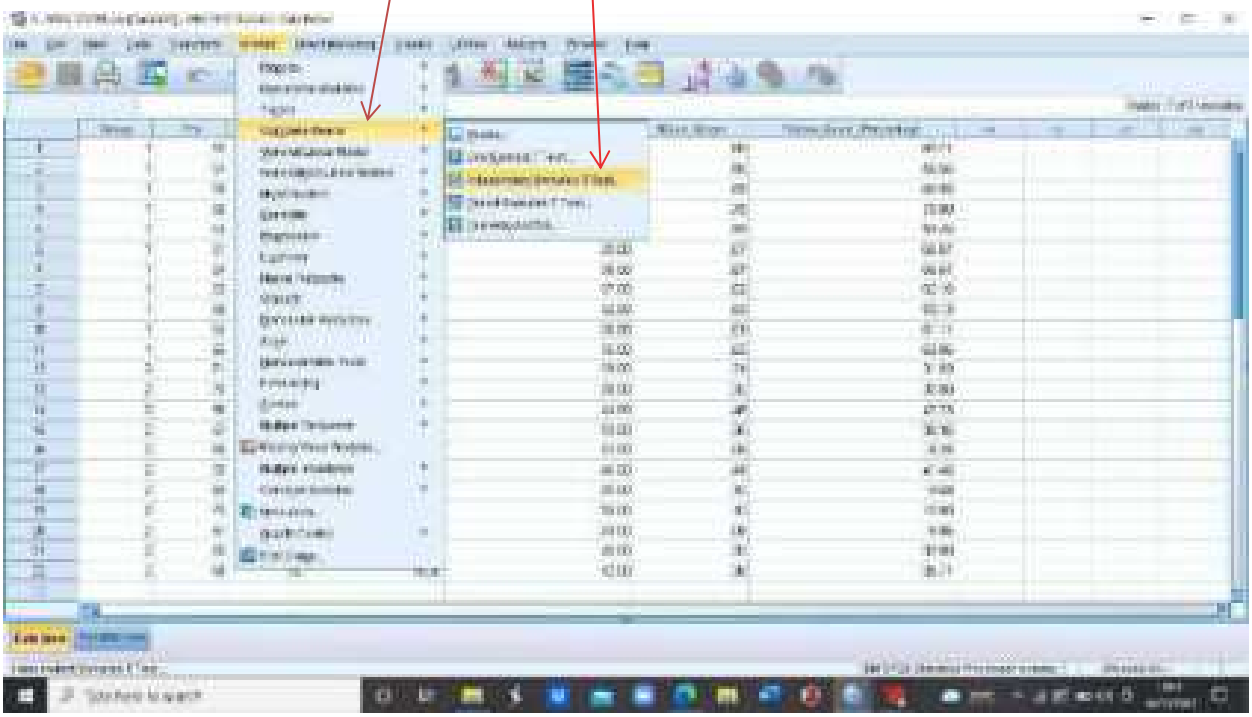
Click plots- click normality test -then click OK

Normality test output

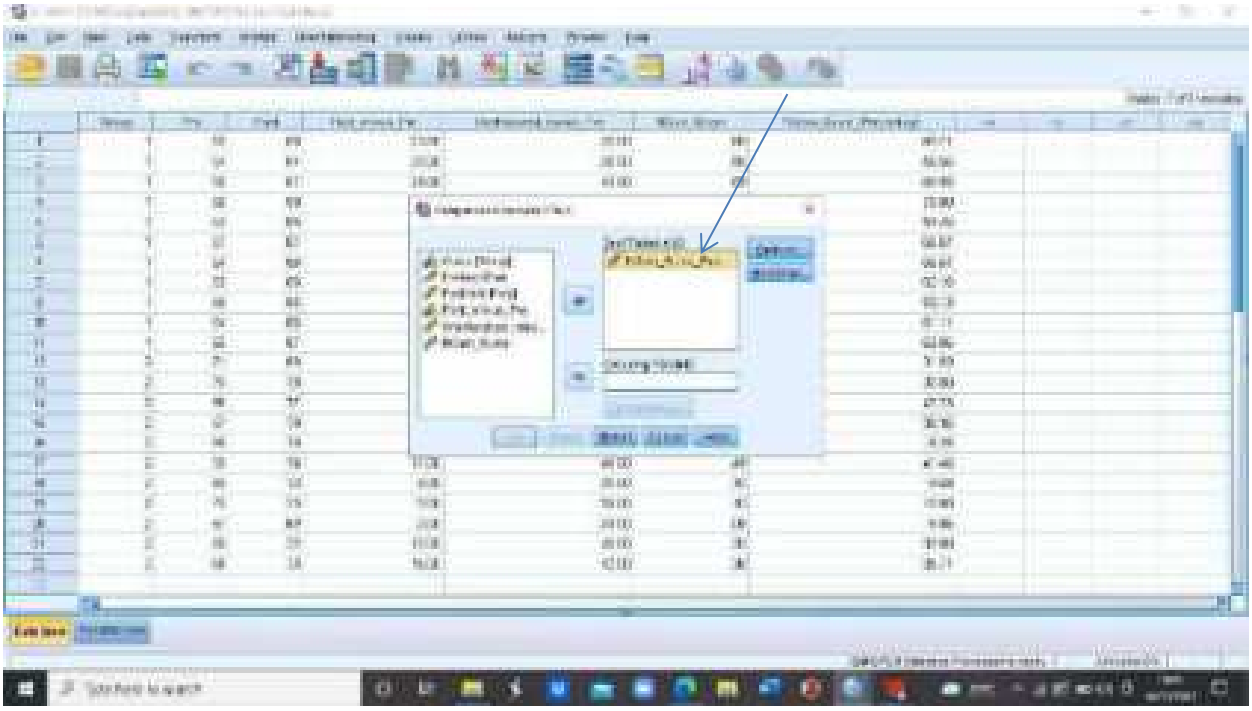


Because the Data is Normally, so that we can go to the Independent sample t test.

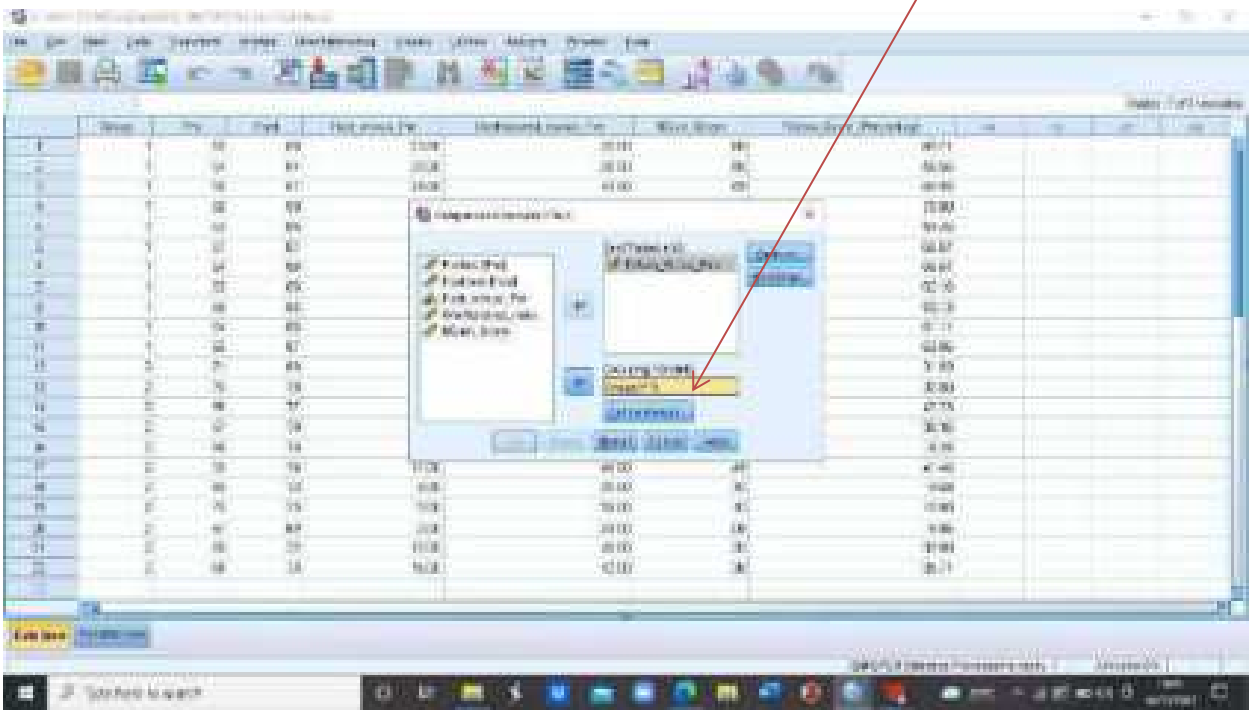
Go to analyze- Compare Means-Independent Sample T Test



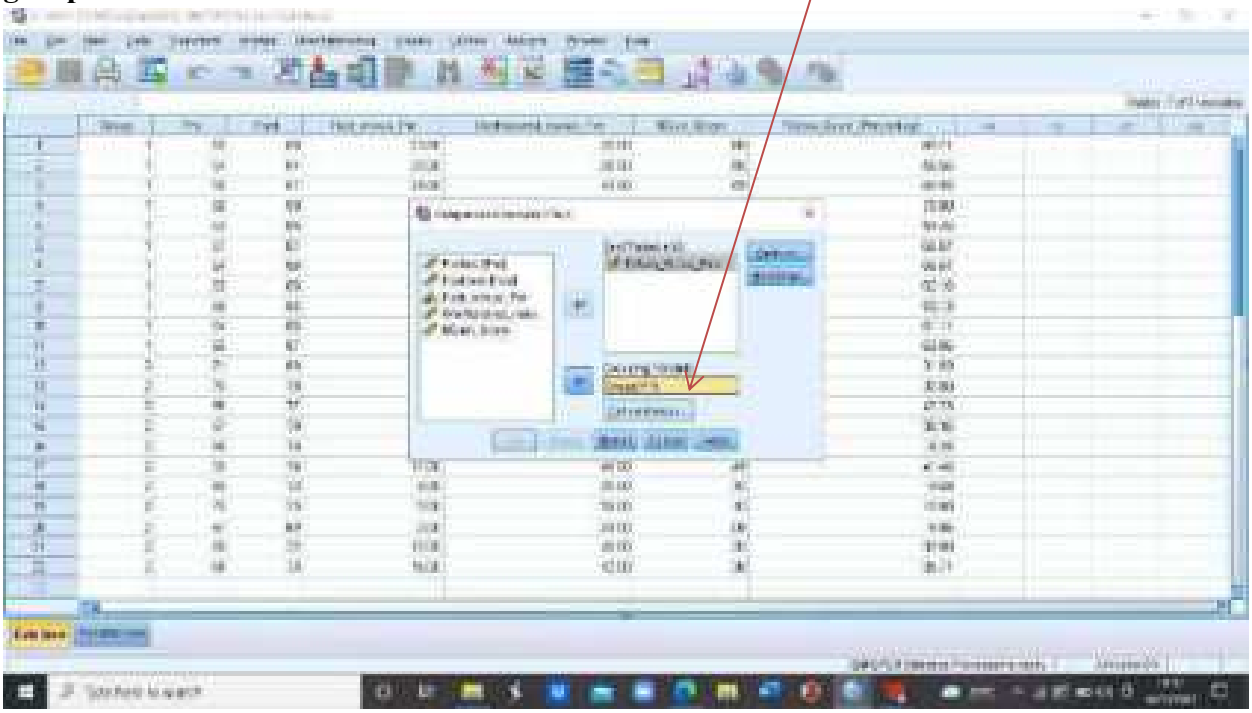
Move to N gain score percentage to the right box on TEST VARIABLE(S) BOX.

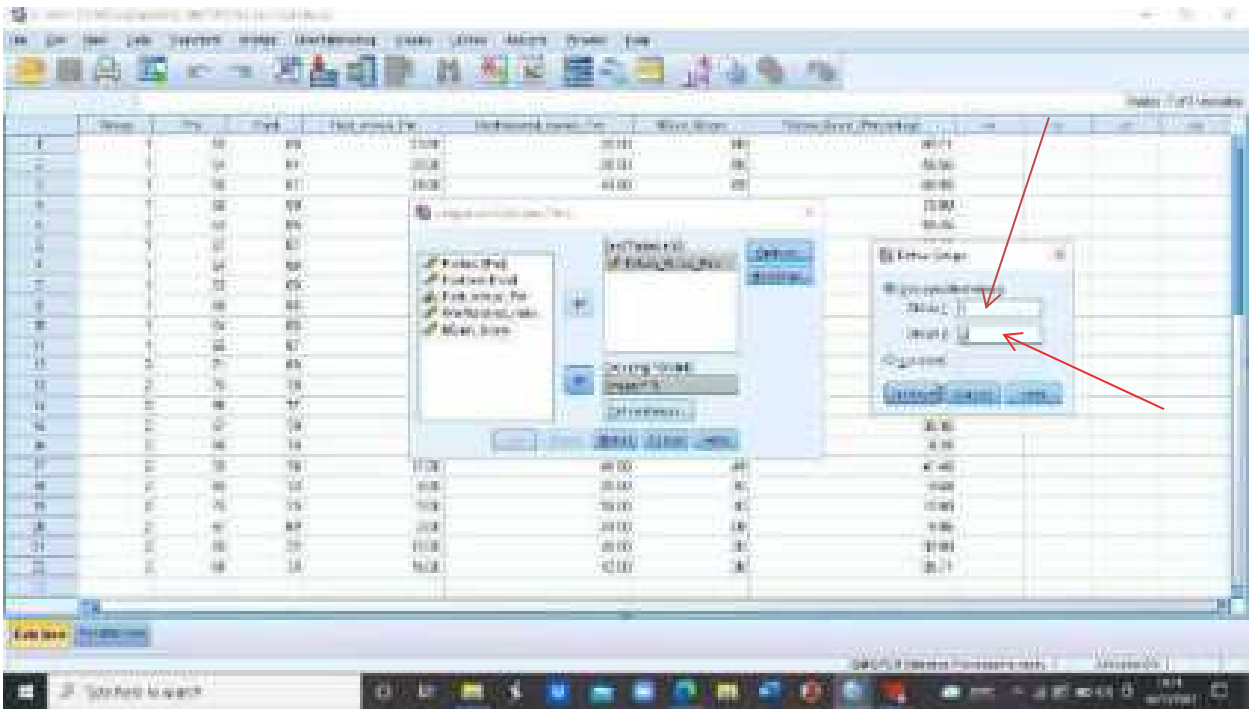


Then, move control group TO RIGHT SIDE ON GROUPING VARIABLE



Then ,click define groups





Type on the dialog box define group

For group 1 is experiment class

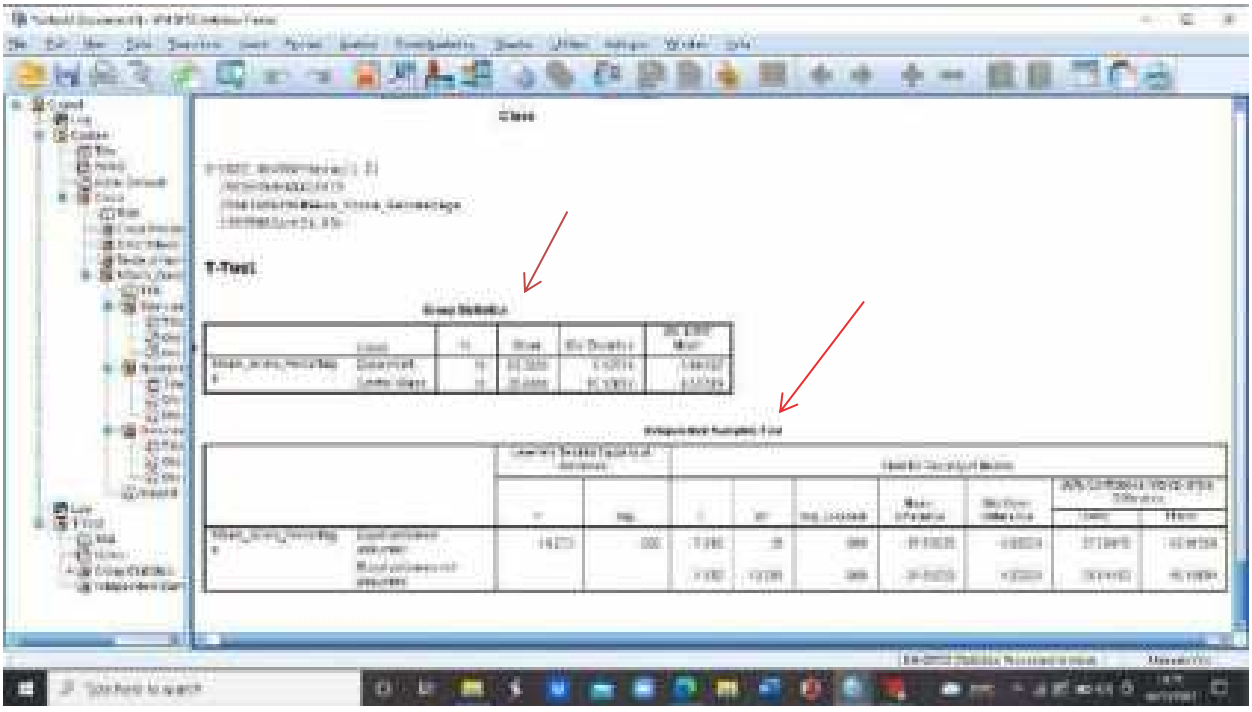
For group 2 is for control class

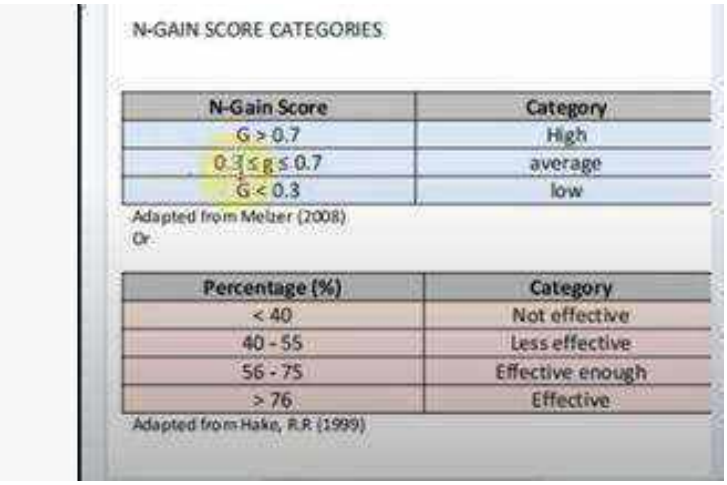
Then , click continue and click OK

There are two the outputs

1. Group Statistics

2. Independent Sample Test





N-GAIN SCORE CATEGORIES

N-Gain Score	Category
G > 0.7	High
0.3 ≤ g ≤ 0.7	average
G < 0.3	low

Adapted from Melzer (2008)
Or

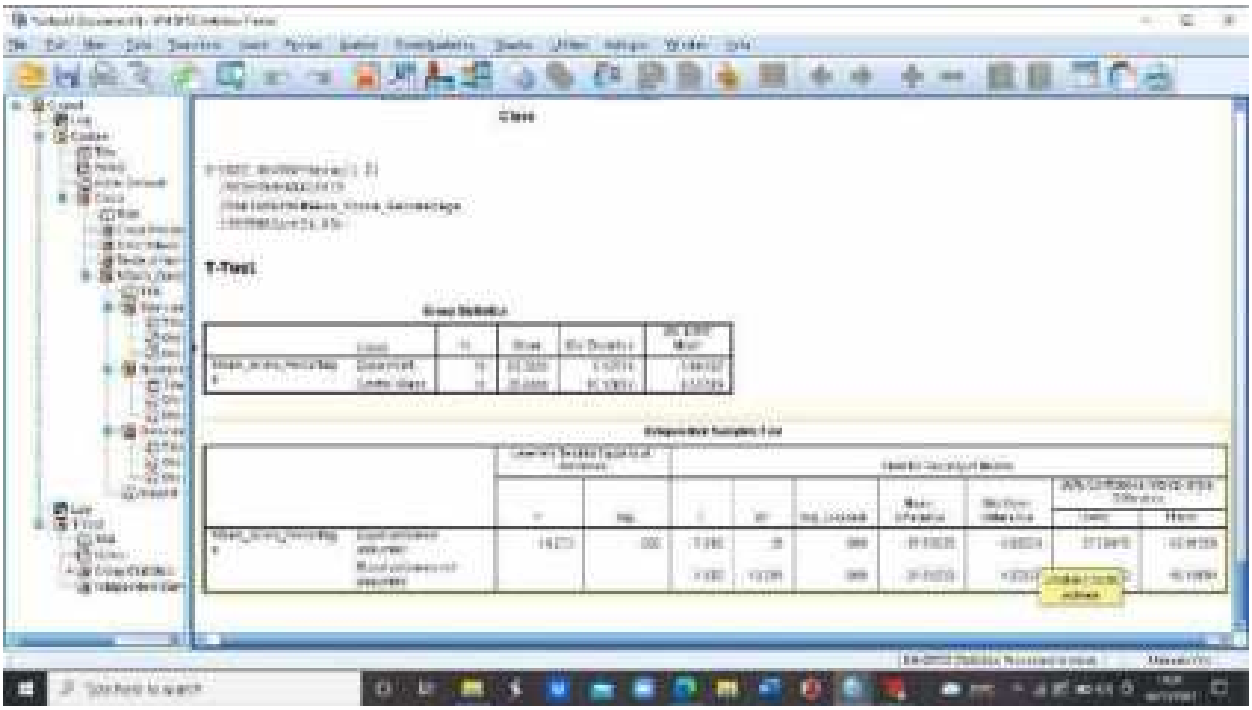
Percentage (%)	Category
< 40	Not effective
40 - 55	Less effective
56 - 75	Effective enough
> 76	Effective

Adapted from Hake, R.R (1999)

- Based on the Group Statistic output table, it is known that the Mean NGain .percentage score for the Experimental Class is 63.3969 or 63.4%.Based on the category table for the interpretation of the effectiveness of the N Gain score (%).It can be concluded that use of cooperative learning methods (in the experimental class) is effective enough in Improving student learning outcomes.
- Furthermore,it is known that the Mean NGain ,percentage score for the Control Class is 25.8446 or 25.8 % .So based on the category table for the interpretation of the effectiveness of the NGain score (%),it can be concluded that the use of conventional learning methods (in the control class)is not effective in Improving student learning outcomes.

◆ So ,Statistically descriptive, it can be said that there are difference in the effectiveness of implementing cooperative learning methods in Improving student learning outcomes.

Second Output

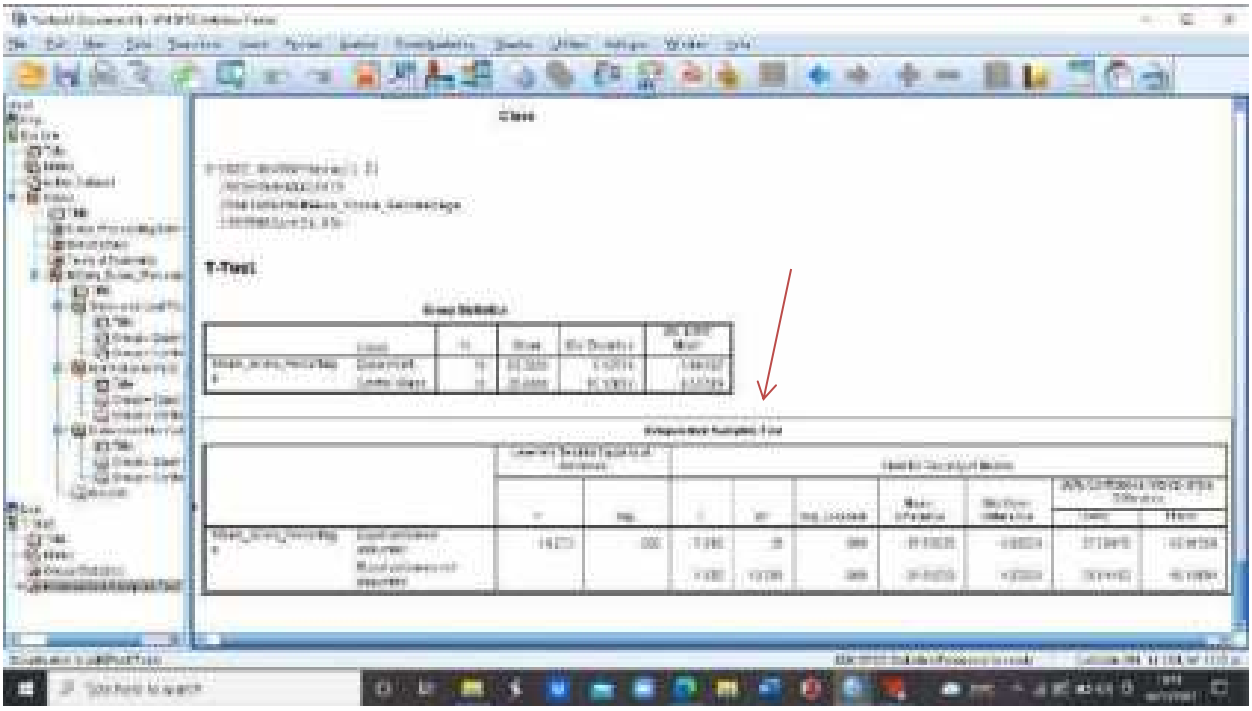


Independent sample t test output interpretation:

Next, to find out the difference in the effectiveness of the two methods is significant or not, the method is to interpret the second output table.''Independent Sample T Test''

- ✓ Based on the output table, it is known the value of sig.on Levene's Test for Equality of Variances is 0.002<0.05 it can be concluded that the variance of the NGain Score (%) for the experimental class and control class data is not homogeneous .Thus, the independent sample t test for then n gain score is guided by value of sig. Contained in the table Equal Variance not assumed.

- ✓ Based on the ''Independent Sample T Test'' output table , it is known that the value of sig.(2-tailed)is 0.000<0.05 ,thus it can be concluded that there is a significant difference in effectiveness between the use of cooperative learning methods and conventional learning methods to improve English Learning outcomes in Recount Text Material for the 11 th grade students of SMA IT AL Fikri Semarang in the academic year 2022.



If the data is not homogeneous , chose the Equal variance not assumed.

16. BAR CHART AND FREQUENCY DISTRIBUTION TABLE OF N-GAIN SCORE with SPSS

BASIC CONCEPTS

1. Descriptive statistical analysis is useful for presenting data in summary form to make it easier for readers to understand.
2. Bar charts and frequency distribution tables are part of the descriptive statistical analysis.
3. Bar charts are useful for showing numbers expressed in the form of rectangular figures.
4. The frequency distribution table is an arrangement of data based on certain categories presented in the form of a summary list (Everitt & Skrondal, 2006; Field, 2005; Garth, 2008; Singh, Kumar, 2006; Vanlalhriati & Singh, 2015; Wagner, 2015).

SAMPLE CASE

- In the previous video tutorial, we have calculated the N-gain score for the experimental class and control class with SPSS.
- The summary of the results of the calculation of the N-gain score can be seen in the following excel data:
- **Note:** the experimental class is used to measure the effectiveness of the use of cooperative learning methods, while the control class is used to measure the effectiveness of using conventional learning methods on English learning outcomes in Recount Text material for the 11th-grade students of SMA-IT Al Fikri Semarang in the academic year 2022.

- For the case example in this video, we will practice how to create a bar chart and frequency distribution table from the N-gain score for the experimental class and control class.

STAGES OF ANALYSIS WITH SPSS

- The first step, we need to look again at the formula for the category of interpretation of the effectiveness of the N-gain score below.

Percentage (%)	Category
< 40	Not effective
40 - 55	Less effective
56 - 75	Effective enough
> 76	Effective

Adapted from Hake, R.R (1999)

- The next step is to group the N-gain score acquisition data for each student (in this case there are 11 students) based on the category formula for the interpretation of the effectiveness of the N-gain score above. This data

grouping value will be used later in the descriptive analysis process with SPSS.

- For students who get an N-gain score <40% then a grouping code of 1 is made, a N-gain score of 40-55% is made a grouping code of 2, a N-gain score of 56-75% is made a grouping code of 3 and a N-gain value is made score >76% made grouping code 4.

- The value of the grouping of N-gain scores for the experimental class can be seen in the excel data on the right

- **INPUT --> ANALYSIS --> SPSS OUTPUT**

INTERPRETATION OF SPSS OUTPUT TABLE "FREQUENCIES"

- Based on the output of "Statistics", it is known that the valid N value is 11, meaning that the number of respondents entered into the SPSS is 11 students.

Statistics

		Experiment Class	Control Class
N	Valid	11	11
	Missing	0	0

- Then in the "Experimental Class" output for the Frequency and Percent sections, it is known that there are 1 or 9.1% students who get a gain score of <40%. Furthermore, there are 10 or 90.9% of students who get a gain score of of 56-75%.

Experiment Class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	40-55% (Less Effective)	1	9.1	9.1	9.1
	56-75% (Effective Enough)	10	90.9	90.9	100.0
	Total	11	100.0	100.0	

❖ On the other hand, in the "Control Class" output for the Frequency and Percent sections, it is known that there are 9 or 81.8% students who get a gain score of <40%. Furthermore, there are 2 or 918.2% of students who get a gain score of of 40-55%.

Control Class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<40% (Not Effective)	9	81.8	81.8	81.8
	40%-55% (Less Effective)	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

BAR CHART OUTPUT FIGURE

❖ The output image shows the frequency distribution of the gain score in the form of a bar chart (its interpretation is as contained in the frequency distribution table).

TUTORIAL & PRACTICE
BAR CHART AND FREQUENCY DISTRIBUTION TABLE OF N-GAIN SCORE WITH SPSS

BASIC CONCEPTS

1. Descriptive statistical analysis is useful for presenting data in summary form to make it easier for readers to understand.
2. Bar Charts and frequency distribution tables are part of the descriptive statistical analysis.
3. Bar Charts are useful for showing numbers expressed in the form of rectangular figures.
4. The frequency distribution table is an arrangement of data based on certain categories presented in the form of a summary list.

Sample Case

- In the previous video tutorial ,we have calculated the N-Gain for the experimental class and control class with SPSS.
- The Summary of the results of the calculation of the N-gain score can be seen in the following excel data :
- Note :the experimental class is used to measure the effectiveness of the use of cooperative learning methods,while the control class is used to measure the effectiveness of using conventional learning methods on English Learning outcomes in Recount text material for the 11th grade students of SMA IT Al Fikri Semarang in the Academic year 2022.

- For the case example in this video ,we will practice how to create a bar chart and frequency distribution table form the N-Gain score for the **experimental class and control class.**

STAGES OF ANALYSIS WITH SPSS

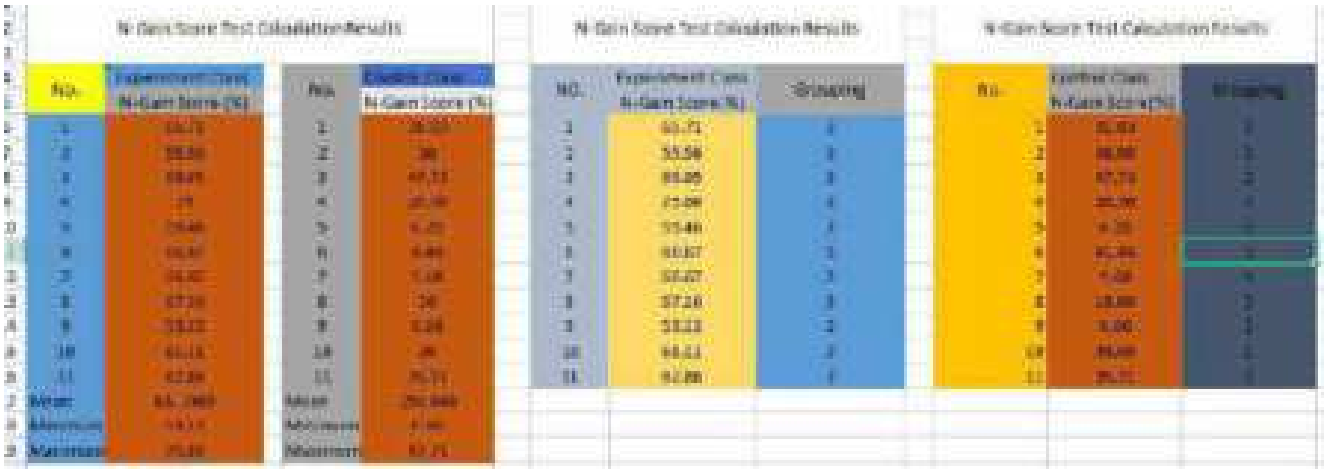
- The first step ,we need to look again at the formula for the category of interpretation of the effectiveness of the N-gain Score below.

Percentage (%)	Category
< 40	Not effective
40 - 55	Less effective
56 - 75	Effective enough
> 76	Effective

Adapted from Hake, R.R (1999)

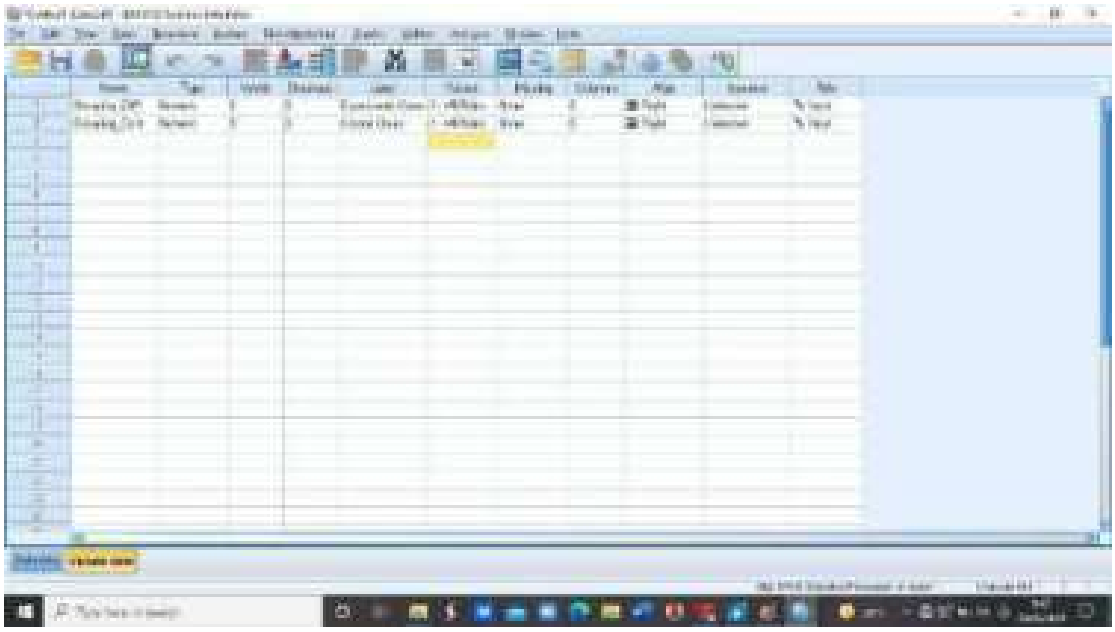
- The next step is to group the N-gain score acquisition data for each student (in this case there 11 students) based on the category formula for the interpretation of the effectiveness of the N-gain score above.This data grouping value will be used later in the descriptive analysis process with SPSS.

- For students who get an N-gain score <40% then a grouping code of 1 is made ,a N-gain score of 40-55% is made a grouping code of 2, a N-gain score of 56-75% is made a grouping code of 3 and a N-gain value is made score > 76% made grouping code 4.
- The value of the grouping of N-gain scores for the experimental class can be seen in the excel data on the below:



- **INPUT-ANALYSIS-SPSS OUTPUT**

Input and type in variable view in SPSS



Click Values ,then type

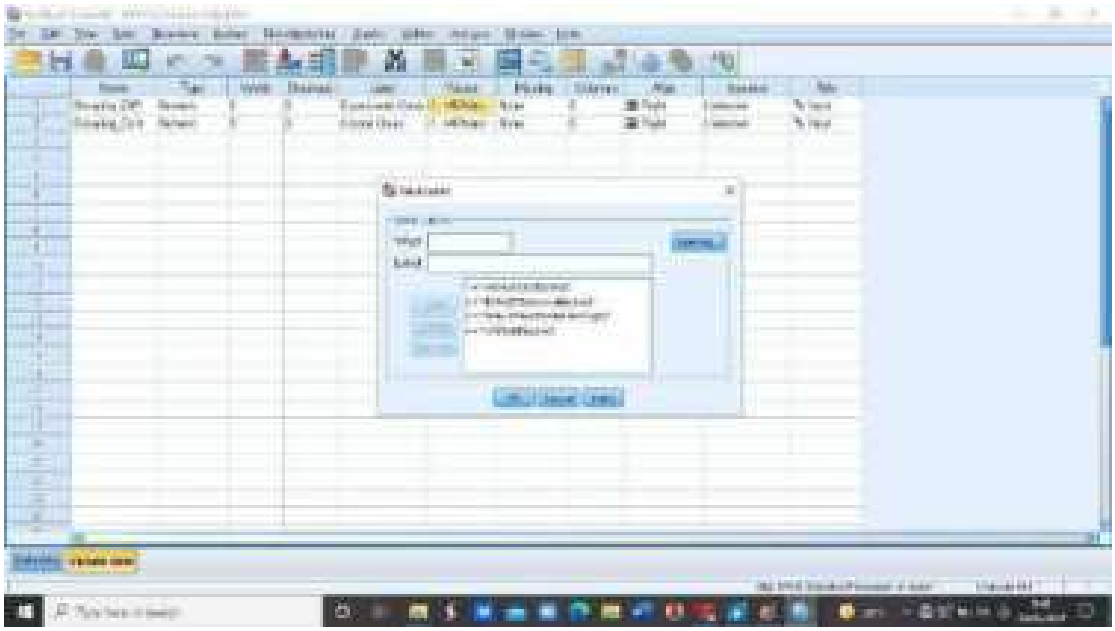
value =1
Label = <40% (not effective)
add

Value =2
Label=40%-55%(Less Effective)
Add

Value=3
Label=56%-75%(Effective enough)
Add

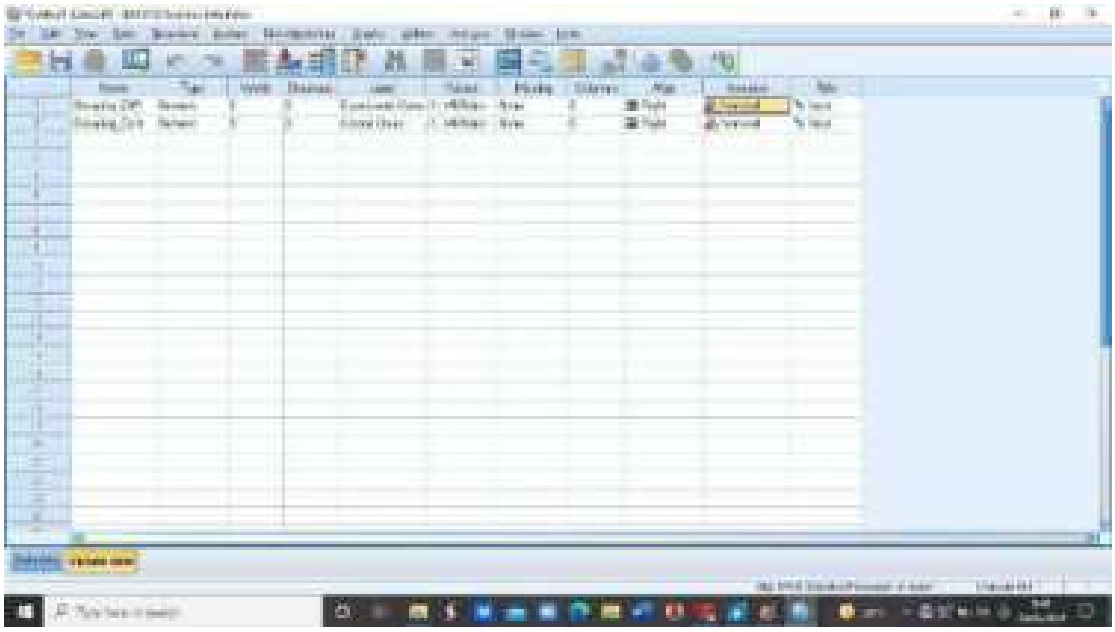
Value=4
Label= >76% (Effective)
Add

Click OK

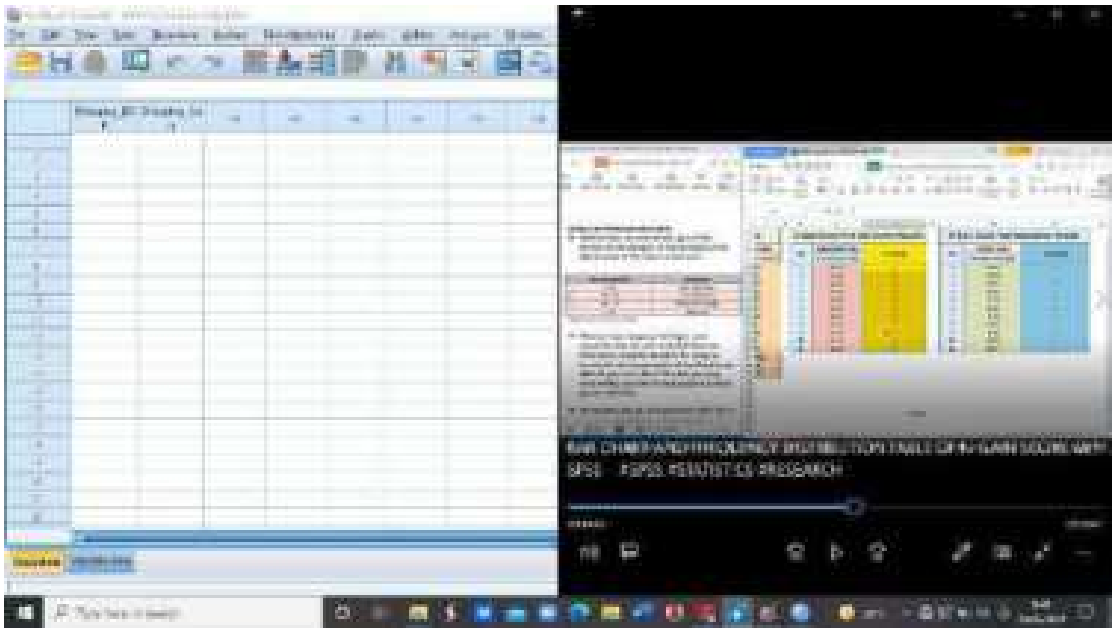


THEN copy in control class on column values.

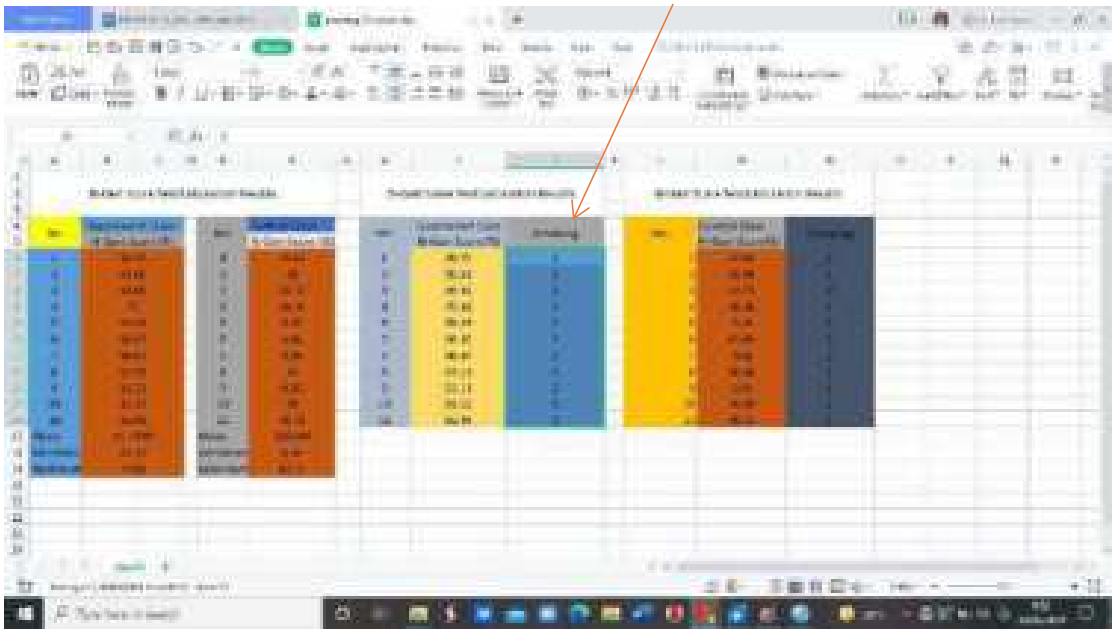
Click measurement-click Nominal

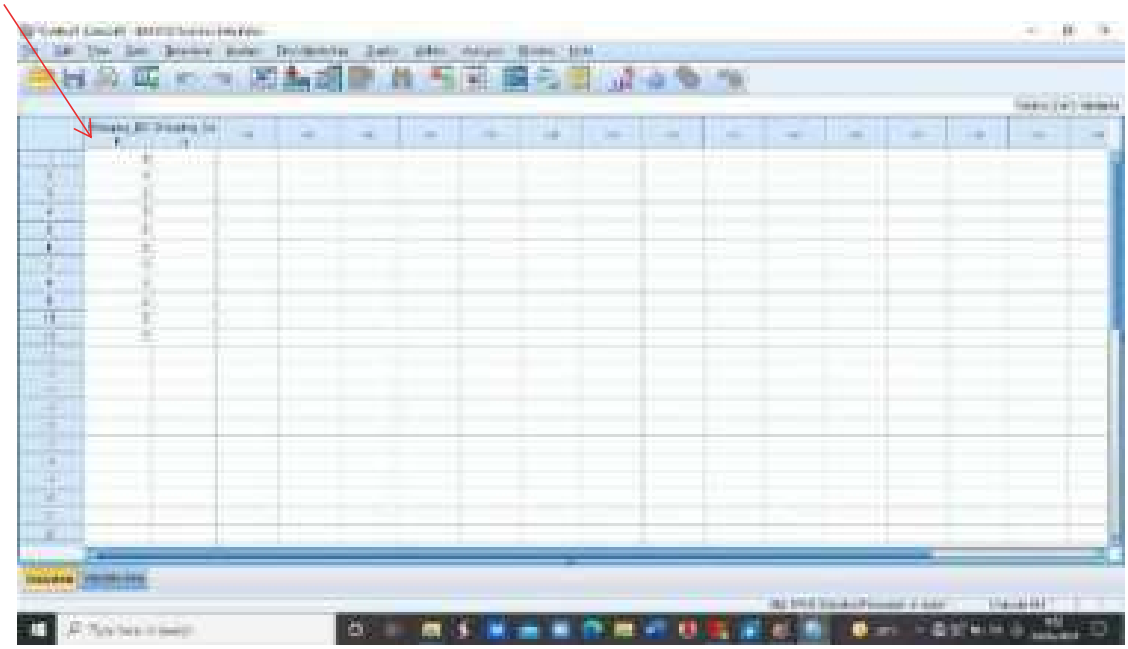


INPUT THE DATA FROM EXCEL WORD

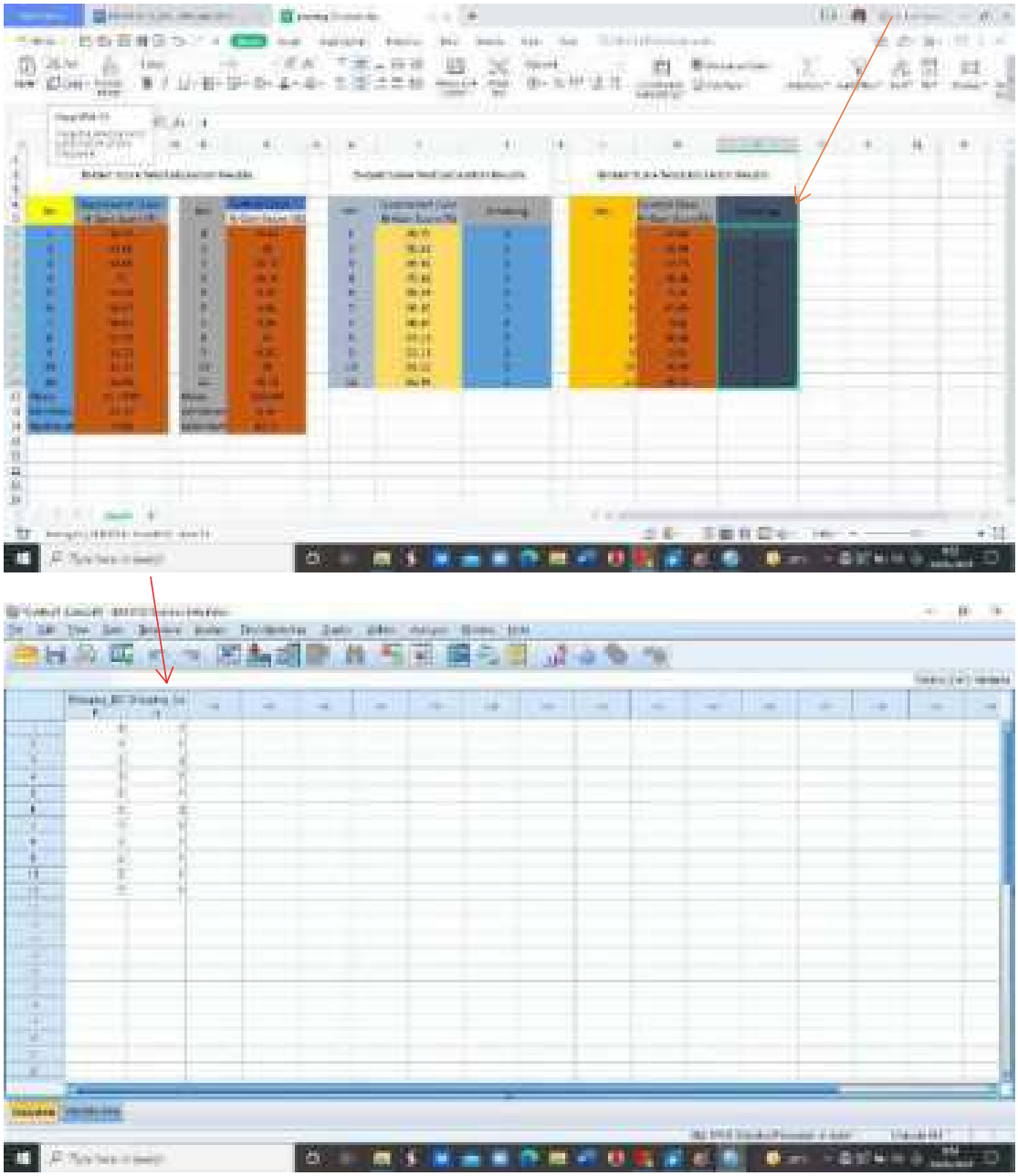


Then , copy the data from the excel Grouping experiment to GROUPING EXP SPSS

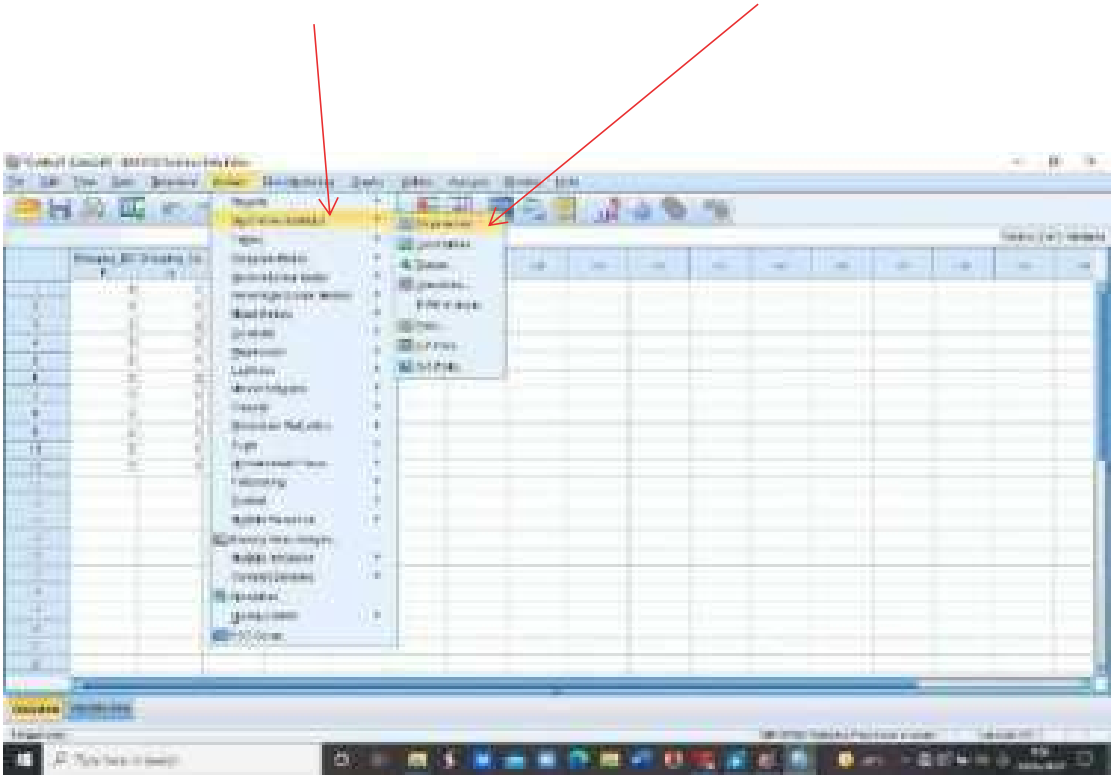


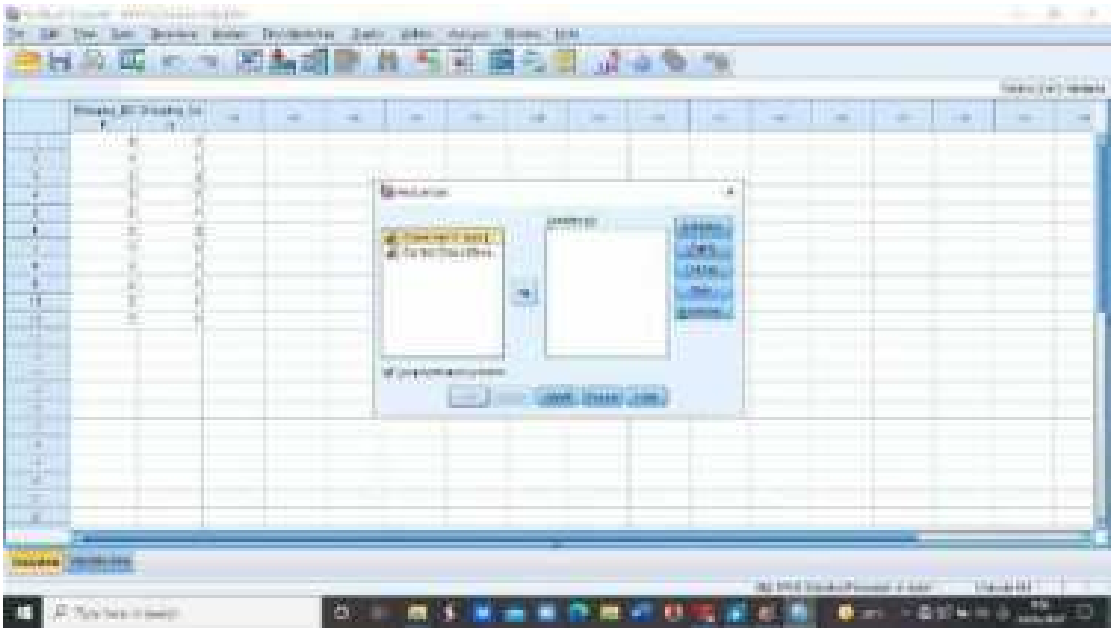


Back to the excel, Copy grouping of control class to GROUPING CONTROL IN SPSS

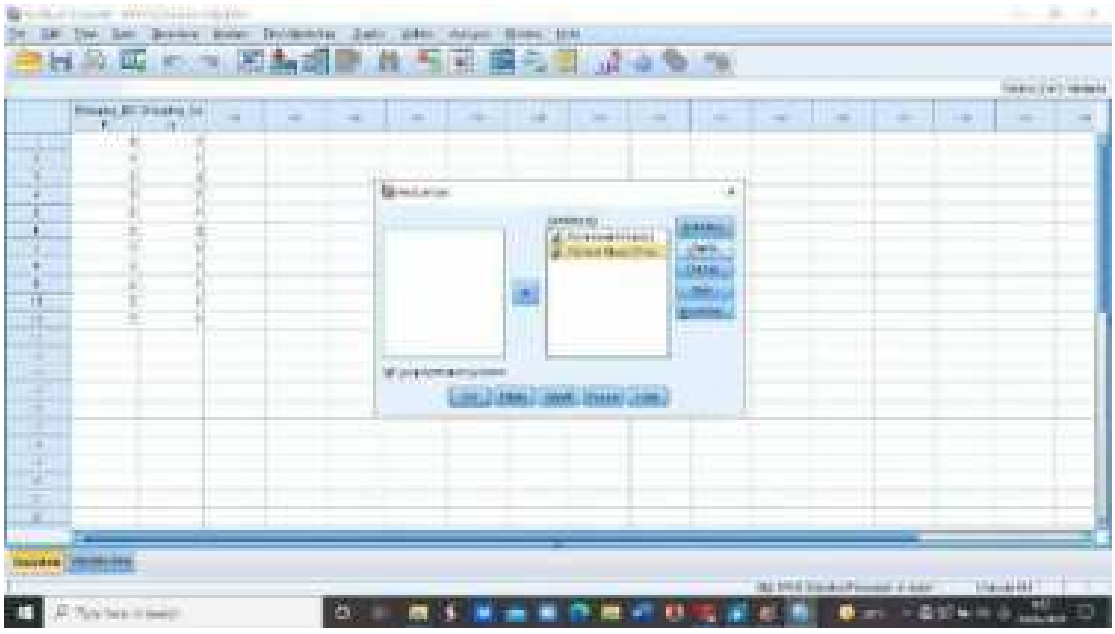


After Input the data - Click Analyze -Frequencies

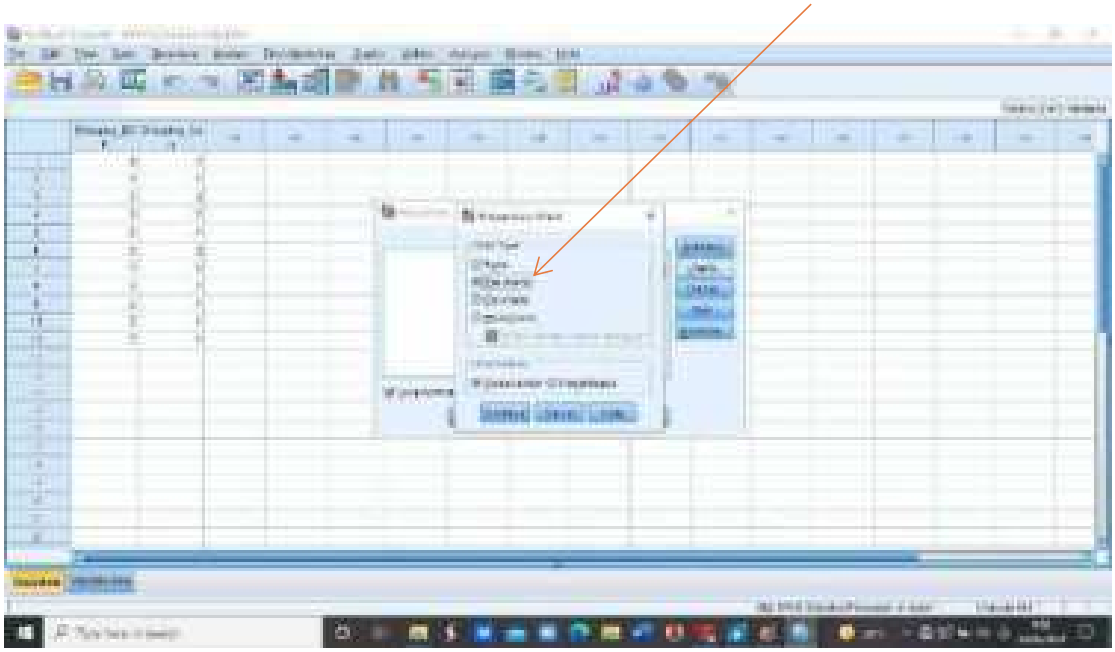




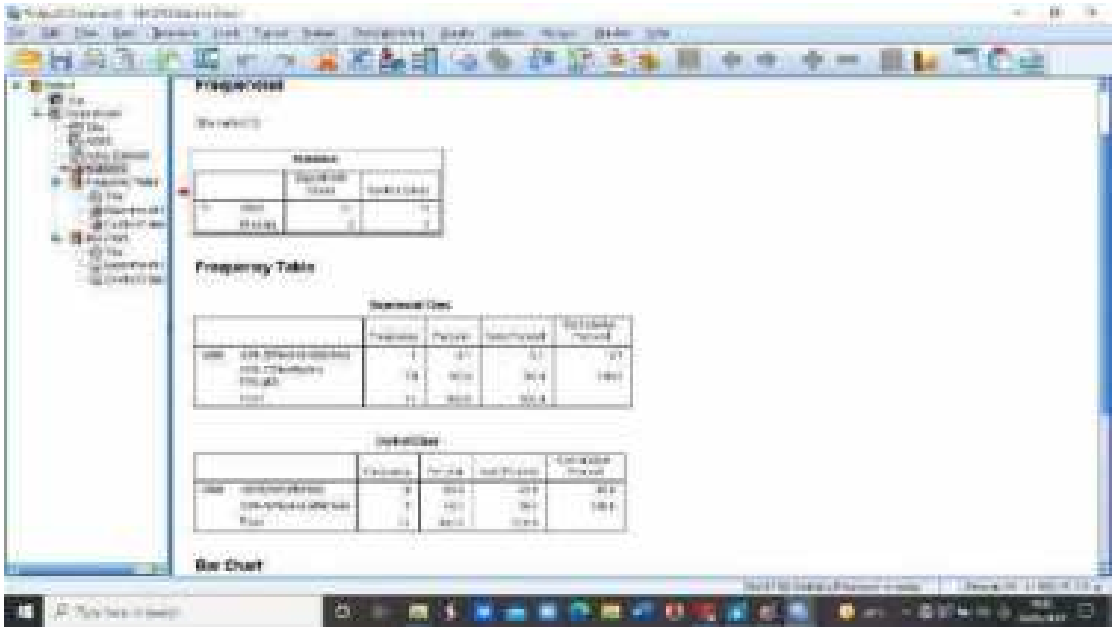
Move the experiment class and control class to the column variable(s) on the right



Click Bar Charts-Frequencies -continue-Click OK.



SPSS OUTPUT



INTERPRETATION OF SPSS OUTPUT TABLE "FREQUENCIES''

- Based on the output of ''statistics'',it is known that the valid N value is 11,meaning that the number of respondents entered into the SPSS is 11 students.

Statistics

		Experiment Class	Control Class
N	Valid	11	11
	Missing	0	0

- Then in the ''Experimental Class'' output for the Frequency and Percent sections, it is known that there are 1 or 9.1% students who get a gain score of <40%.Furthermore,there are 10 or 90.9% of students who get a gain score of 56-75%.

Experiment Class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	40%-55%(less effective)	1	9.1	9.1	9.1
	56%-75%(effective Enough)	10	90.9	90.9	100.0
	Total	11	100.0	100.0	

On the other hand , in the ''Control Class'' output for the Frequency and Percent sections, it is known that there are 9 or 81.8% students who get a gain score of <40%.Furthermore ,there are 2 or 918.2% of students who get a gain score of 40-55%.

Control Class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<40%(not effective)	9	81.8	81.8	81.8
	40%-55%(less effective)	2	18.2	18.2	100.0
	Total	11	100.0	100.0	

Bar Chart Output Figure

- The output image shows the frequency distribution of the gain score in the form of a bar chart (its interpretation is as contained in the frequency distribution table).

17. ONE WAY ANOVA SPSS TUTORIAL & PRACTICE

Research Example
A researcher wants to examine whether there are differences in the effects of three learning methods, namely methods A, B, and C on learning achievement. Class 1 A was taught method A, class 1 B was taught method B, class 1C was given method C. At the end of the semester, they were given the same test. For analysis purposes, 15 students were taken randomly from class 1A, 15 students were taken from class 1 B, and 15 students were taken from class 1C. Their score data are presented in table 1. If a significance level of 5% is taken, what are the conclusions of the study?

One Way ANOVA Hypothesis Testing.
It is used to test the difference in the mean of three or more independent data groups (Everitt & Skrondal, 2006; Friedrich et al., 2017; Ioan, 2016; Kim, 2017; Ostertagová & Ostertag, 2013; Solutions, 1918; Wilmot & Mansell, 2014). The analysis prerequisites are:
1. Samples are taken randomly from the population.
2. The sample comes from an independent group.
3. The variance between groups must be homogeneous
4. The data of each group are normally distributed.

Test Name: One Way Anova Test
1. Normality Test

Tests of Normality

	Methods	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning_Achievement	Method A	.127	15	.200*	.947	15	.482
	Method B	.166	15	.200*	.941	15	.397
	Method C	.146	15	.200*	.939	15	.376

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

2. Homogeneity Test

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Learning_Achievement	Based on Mean	1.589	2	42	.216
	Based on Median	1.178	2	42	.318
	Based on Median and with adjusted df	1.178	2	40.109	.318
	Based on trimmed mean	1.575	2	42	.219

3. One way Anova SPSS Output

Descriptives

Learning_Achievement

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Method A	15	69.40	10.091	2.605	63.81	74.99	54	85
Method B	15	69.87	7.900	2.040	65.49	74.24	51	81
Method C	15	78.93	7.235	1.868	74.93	82.94	68	91
Total	45	72.73	9.413	1.403	69.91	75.56	51	91

ANOVA

Learning_Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	866.533	2	433.267	6.001	.005
Within Groups	3032.267	42	72.197		
Total	3898.800	44			

4. Conclusion

There are 2 ways to draw the conclusion, first using F table and F count; second use significance value.

a. Hypothesis

Ho: There is no difference in learning achievement between the three learning methods.

Hi: There is a difference in learning achievement between the three learning methods.

b. Test Criteria:

1) using F table and F count

- If F count ≤ F table then Ho is accepted

- If F count > F table then Ho is rejected

2) use significance

- If sig ≥ 0.05 then Ho is accepted

- If sig < 0.05 then Ho is rejected

c. Conclusions

1) Using F table and F count

- Define F table

The F table can be seen in the statistical book at a significance of 0.05 with df1 = 2 and df2 = 42. The result is an F table of 3.220.

- Comparing F table and F count

From the SPSS one way ANOVA output, it is known that F count is 6.001. The calculated F count > F table (6.001 > 3. 220) then Ho is rejected. So it can be concluded that there are differences in learning achievement among the three learning methods. (Check the average learning achievement of each method in the descriptive table in the one way ANOVA output)

2) Using significance value

From the SPSS one way ANOVA output, it is known that sig. of 0.005. Because 0.005 < 0.05 then Ho is rejected. So it can be concluded that there are differences in learning achievement among the three learning methods. (Check the average learning achievement rate of each method in the descriptive table in the one way ANOVA output)

Since Ho was rejected, it was continued with a further ANOVA test (Post hoc) to find out which of the methods were significantly different from the others. ANOVA further test used, for example, Scheffe test.

Scheffe test

Multiple Comparisons

Dependent Variable: Learning_Achievement

Scheffe

(I) Methods	(J) Methods	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Method A	Method B	-.467	3.103	.989	-8.34	7.41
	Method C	-9.533*	3.103	.014	-17.41	-1.66
Method B	Method A	.467	3.103	.989	-7.41	8.34
	Method C	-9.067*	3.103	.021	-16.94	-1.19
Method C	Method A	9.533*	3.103	.014	1.66	17.41
	Method B	9.067*	3.103	.021	1.19	16.94

*. The mean difference is significant at the 0.05 level.

Sig > 0.05 --> no difference
Sig < 0.05 --> there is a difference --> (see the section on the mean difference marked with an asterisk)

Conclusion:
a) there is no difference in learning achievement between those taught using method A and method B.
b) there is a difference in learning achievement between those taught using method A and method C. The learning achievement taught using method C is higher than those taught using method A.
c) there is a difference in learning achievement between those taught using method B and method C. The learning achievement taught using method C is higher than those taught using method B.

17. TUTORIAL & PRACTICE

ONE WAY ANOVA _NORMALITY TEST ,HOMOGENEITY TEST ,ONE WAY ANOVA SPSS .

Research Example :

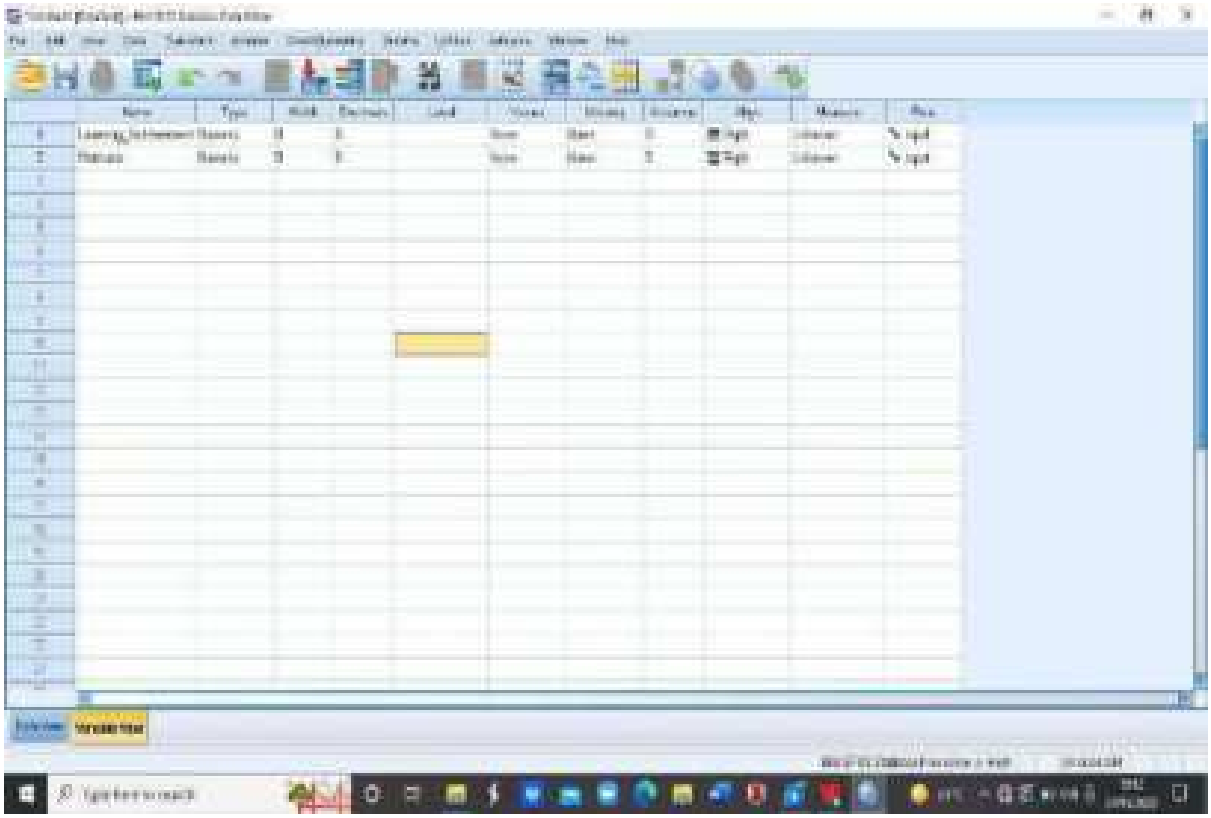
A researcher wants to examine whether there are difference in the effects of three learning methods,namely **methods A ,B ,and C** on learning achievement.Class 1 A was taught method A, class 1 B was taught method B ,class 1 C was given method C. At the end of the semester ,they were given the same test.For analysis purposes, 15 students were taken randomly from class 1 A ,15 Students were taken from class 1 B ,and 15 students were taken from class 1 C. Their score data are presented in table 1. If a significance level of 5 % is taken ,what are the conclusions of the study?

One Way ANOVA Hypothesis Testing.
Its used to test the difference in the mean of three or more independent data groups.The analysis prerequisites are:

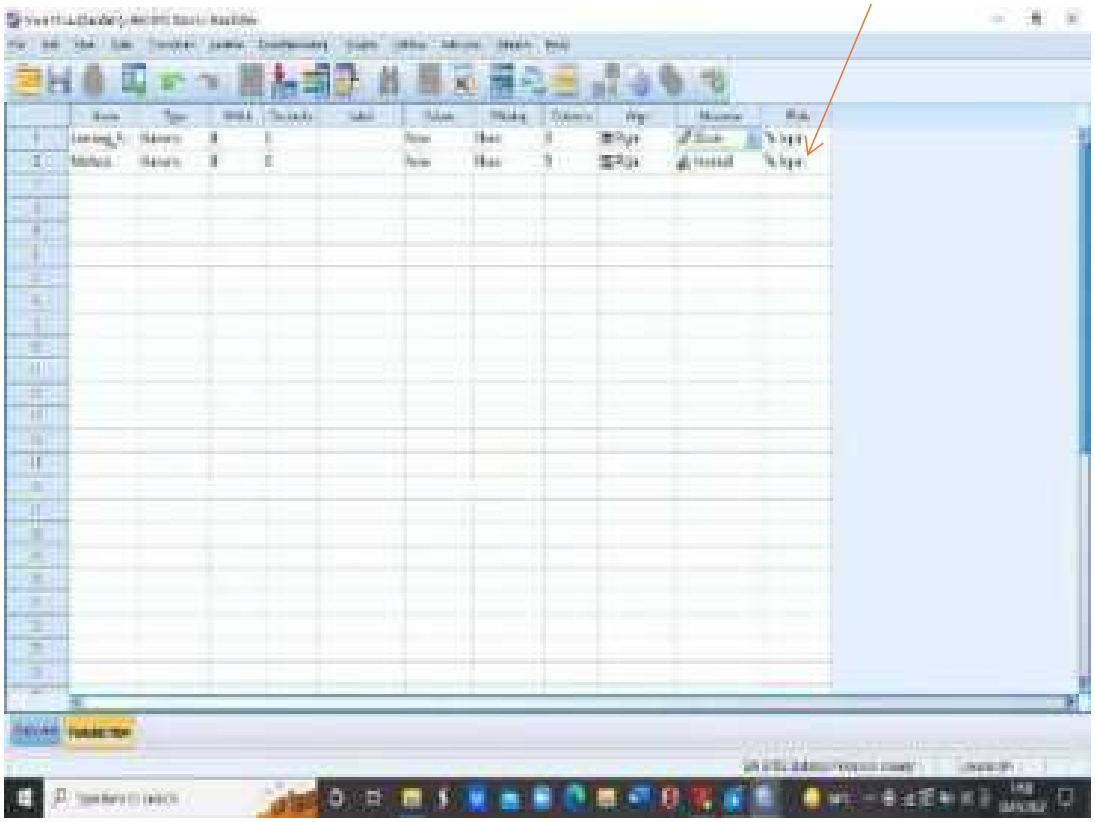
1. Samples are taken randomly from the population
2. The sample comes from an independent group.
3. The Variance between groups must be homogeneous
4. The data of each group are normally distributed.

STEPS :

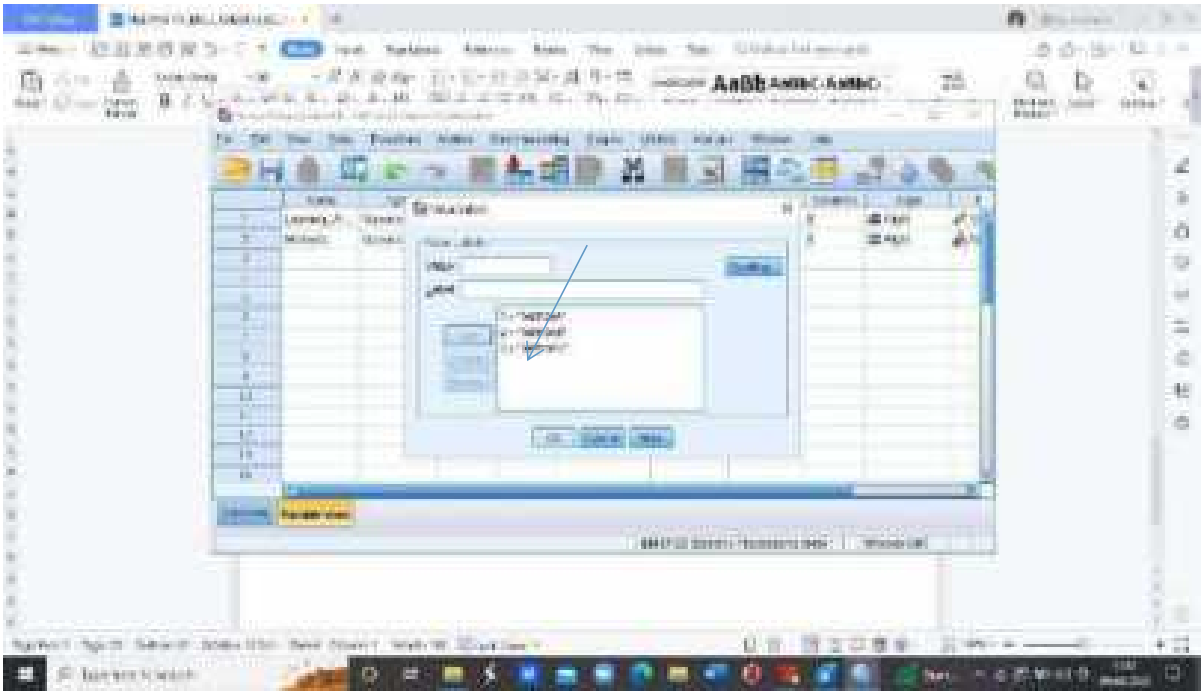
Go to Spss -Click variable view

1. 

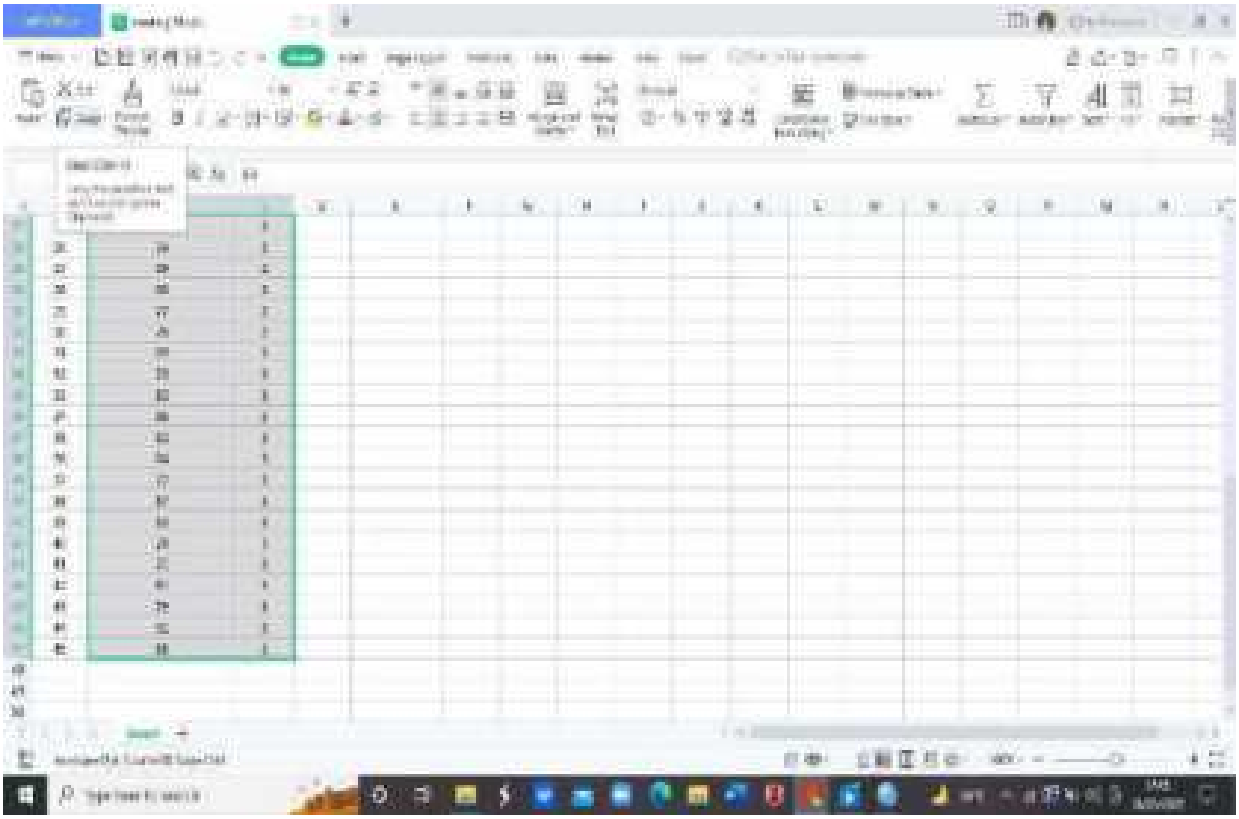
Click measure



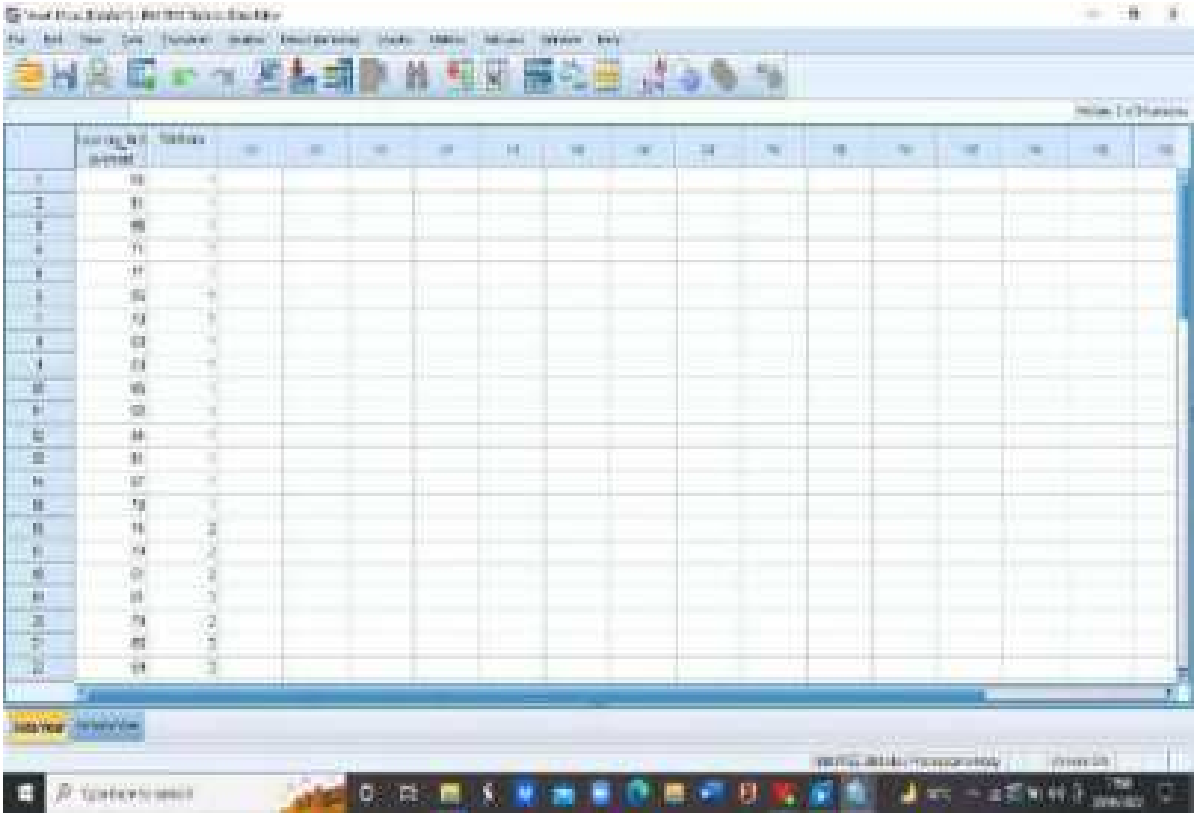
Click and type
Value =1
Label =Method A
Value=2
Label =Method B
Value =3
Label=Method C



Copy and paste the data from excel

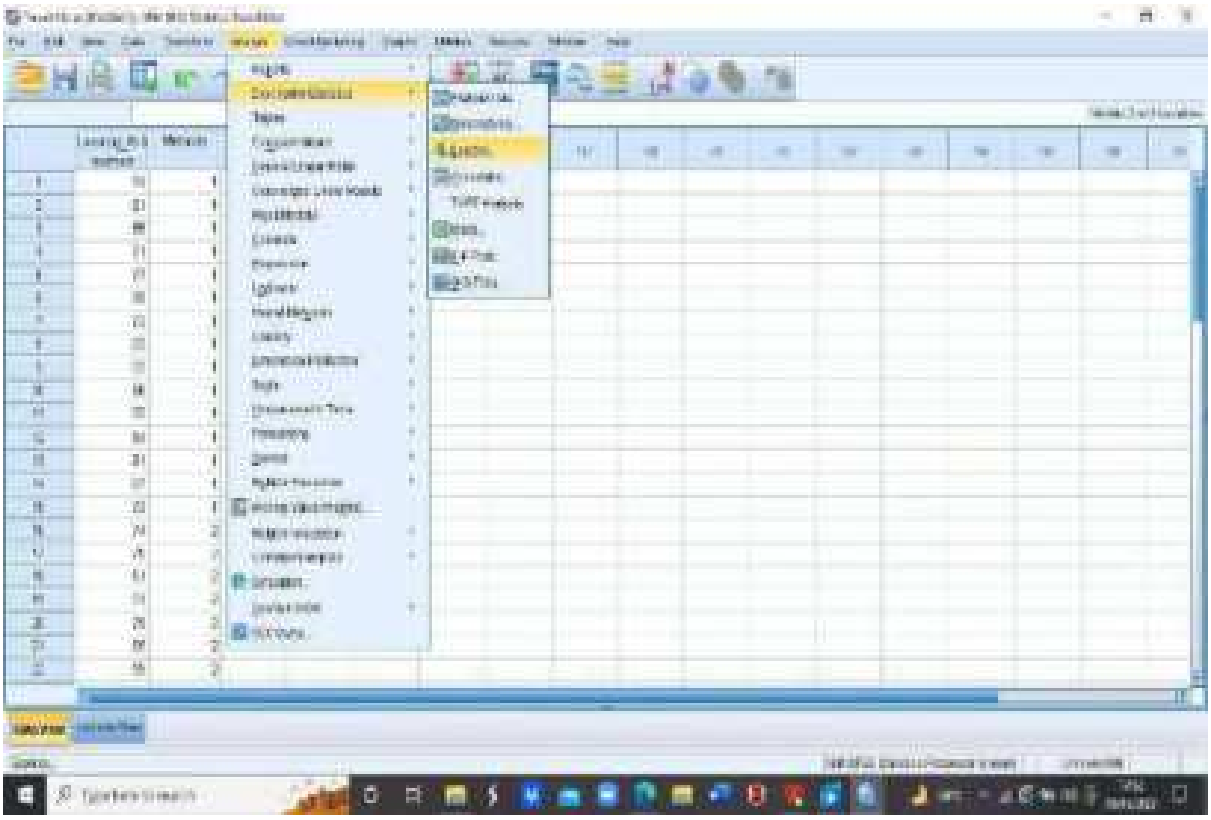


Paste in SPSS

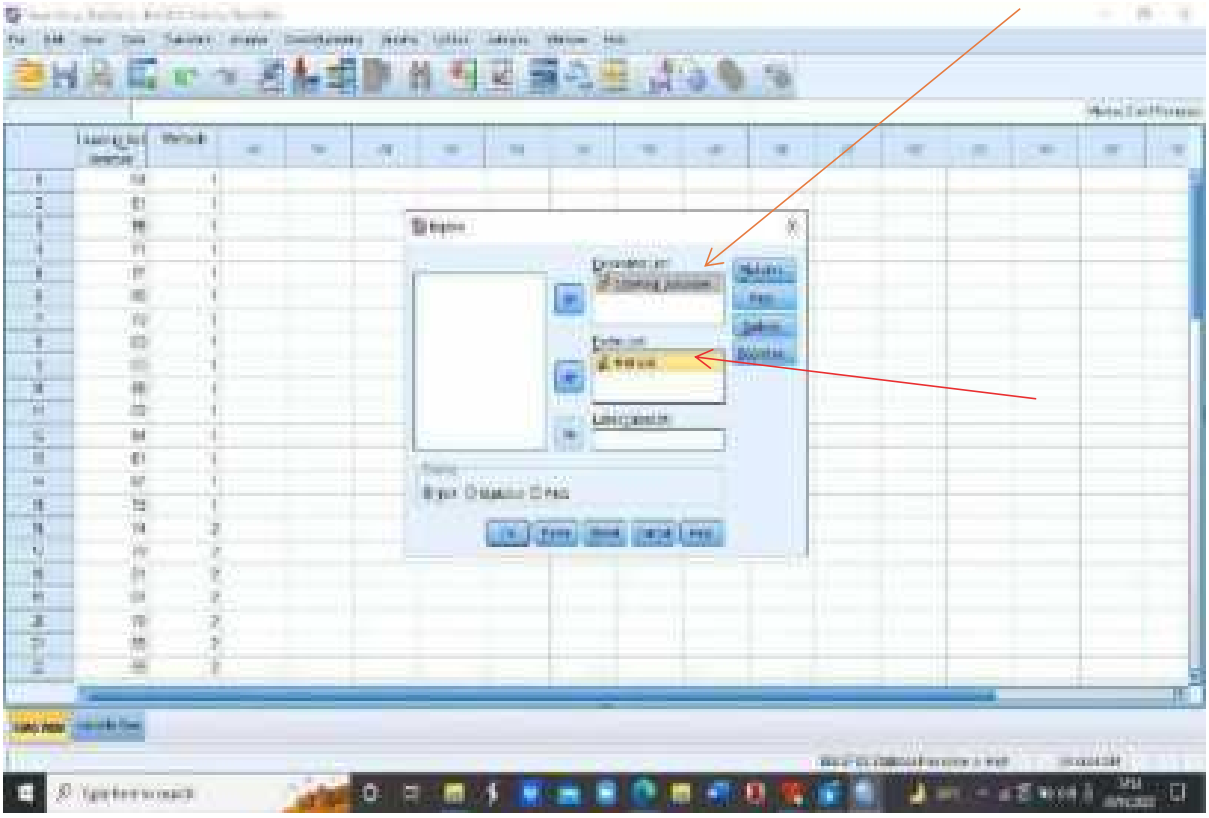


Check the Normality test with SPSS

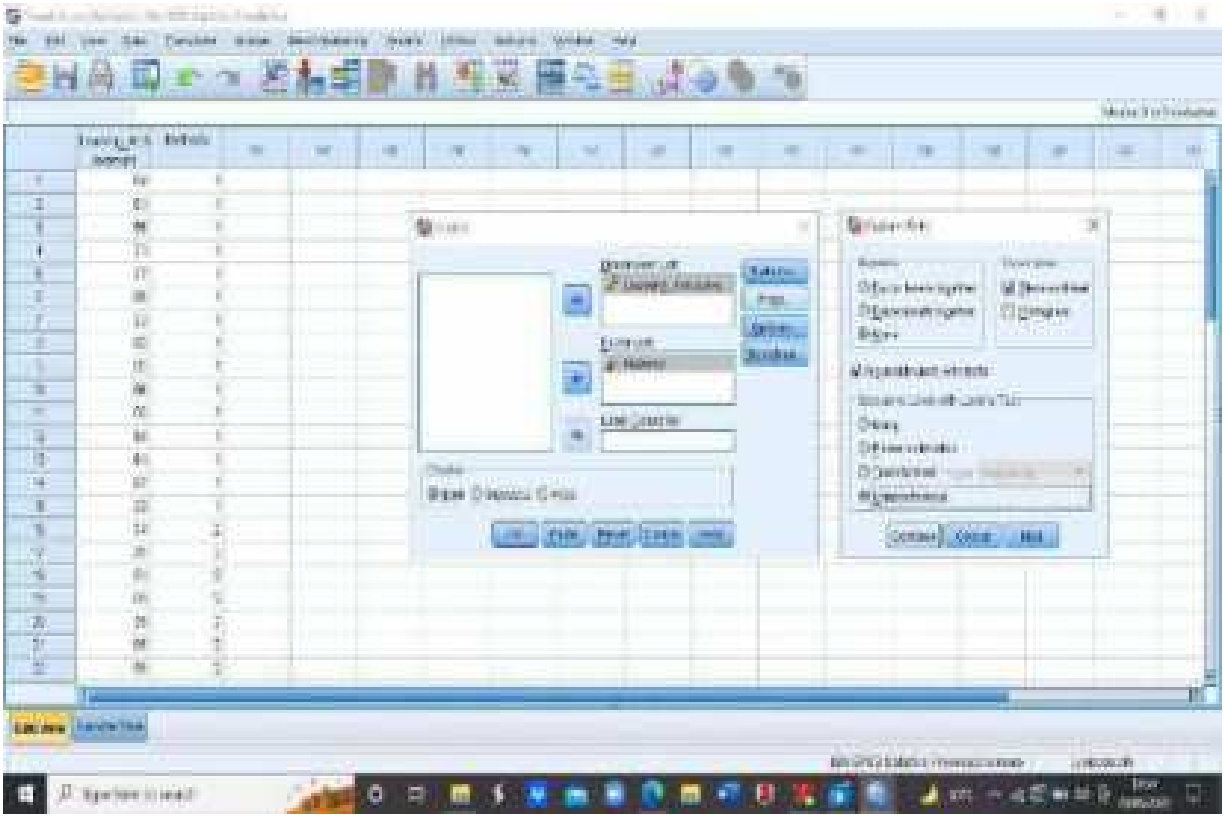
Open the SPSS -click Descriptive statistics -Explore



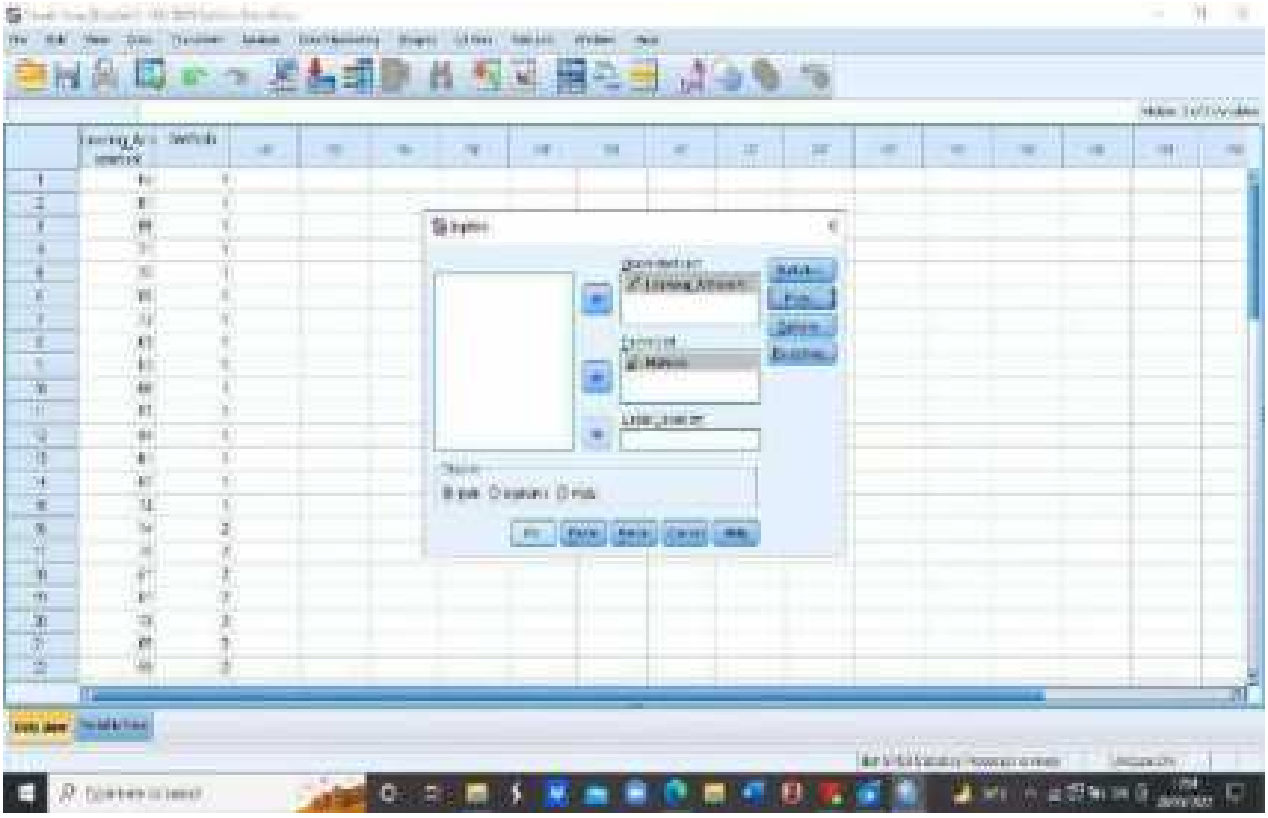
Move Learning Achievement to the dependent list on the right
Move Methods to the factor list on the right.



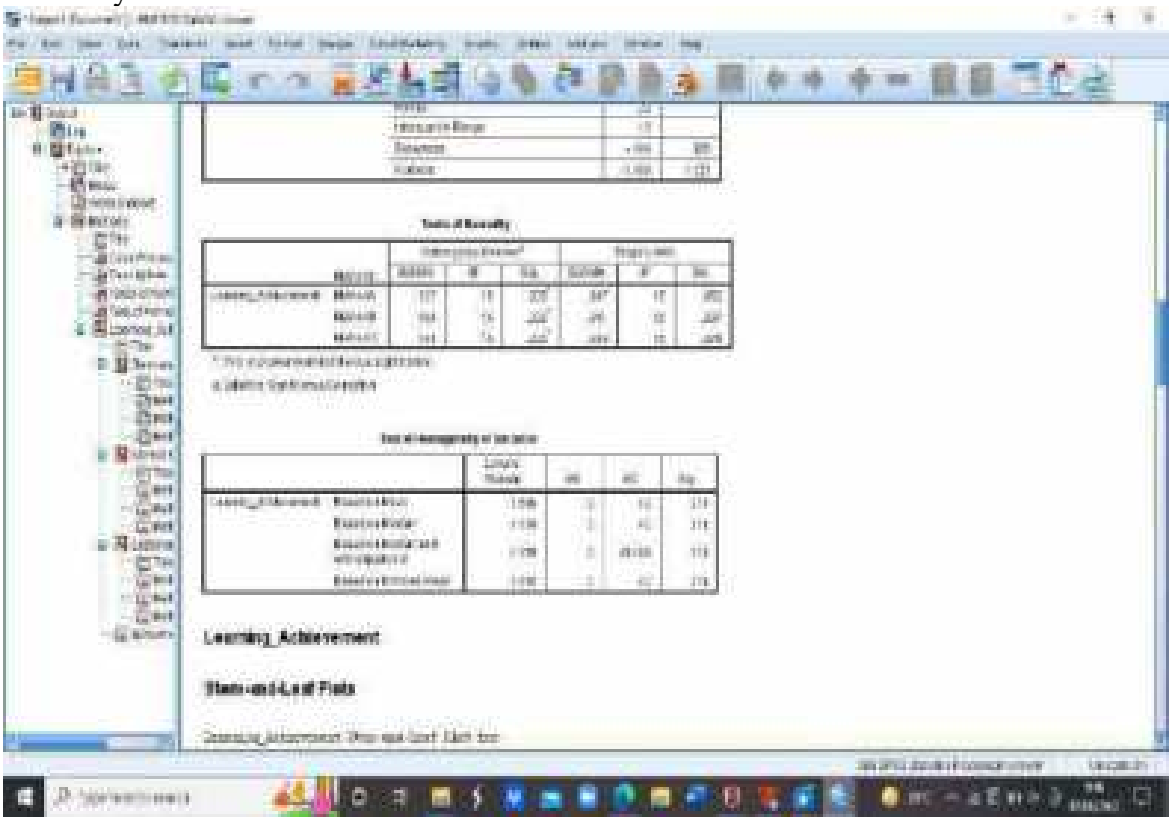
Click none on Bloxpots
Click normality test
CLIK Untransformed
Click continue



Click OK



Output of Normality Test



Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Methods	Statistic	df	Sig.	Statistic	df	Sig.
Learning_Achievement	MethodA	.127	15	.200*	.947	15	.482
	MethodB	.166	15	.200*	.941	15	.397
	Method C	.146	15	.200*	.939	15	.376

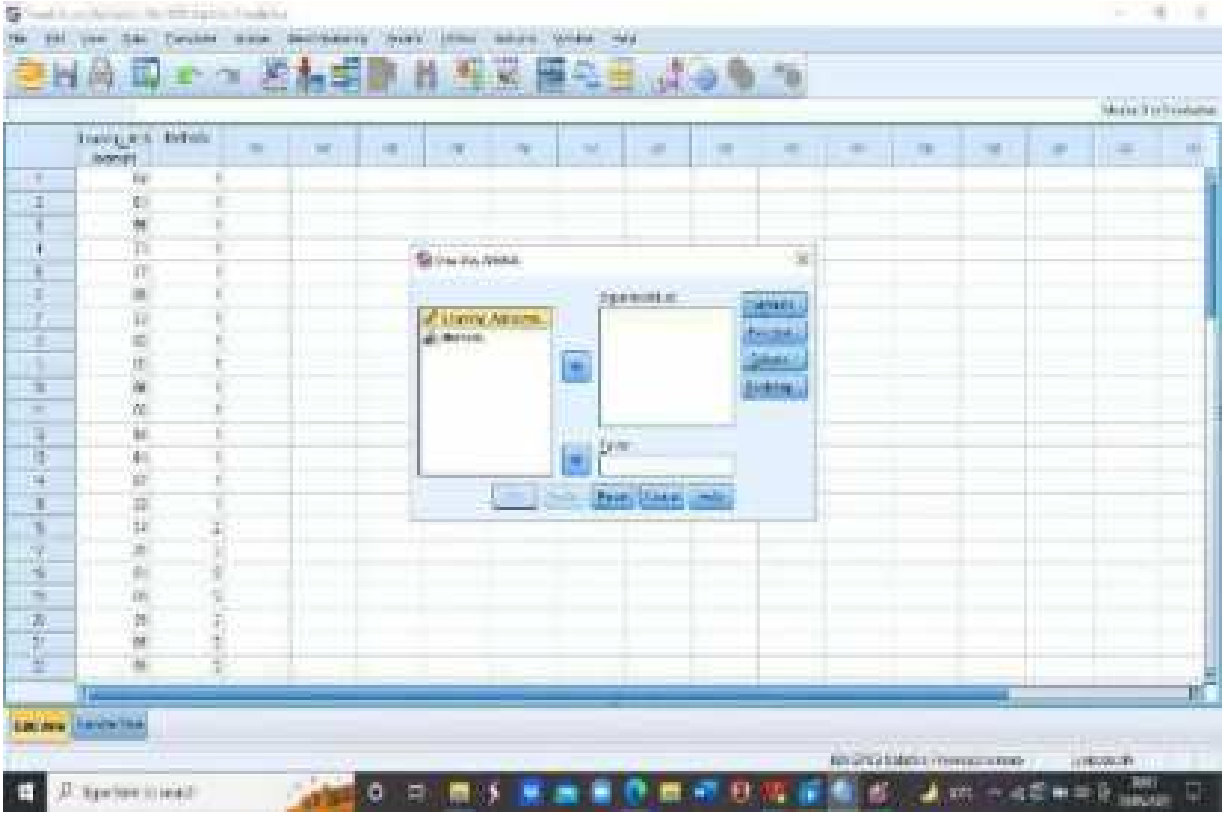
*. This is a lower bound of the true significance.

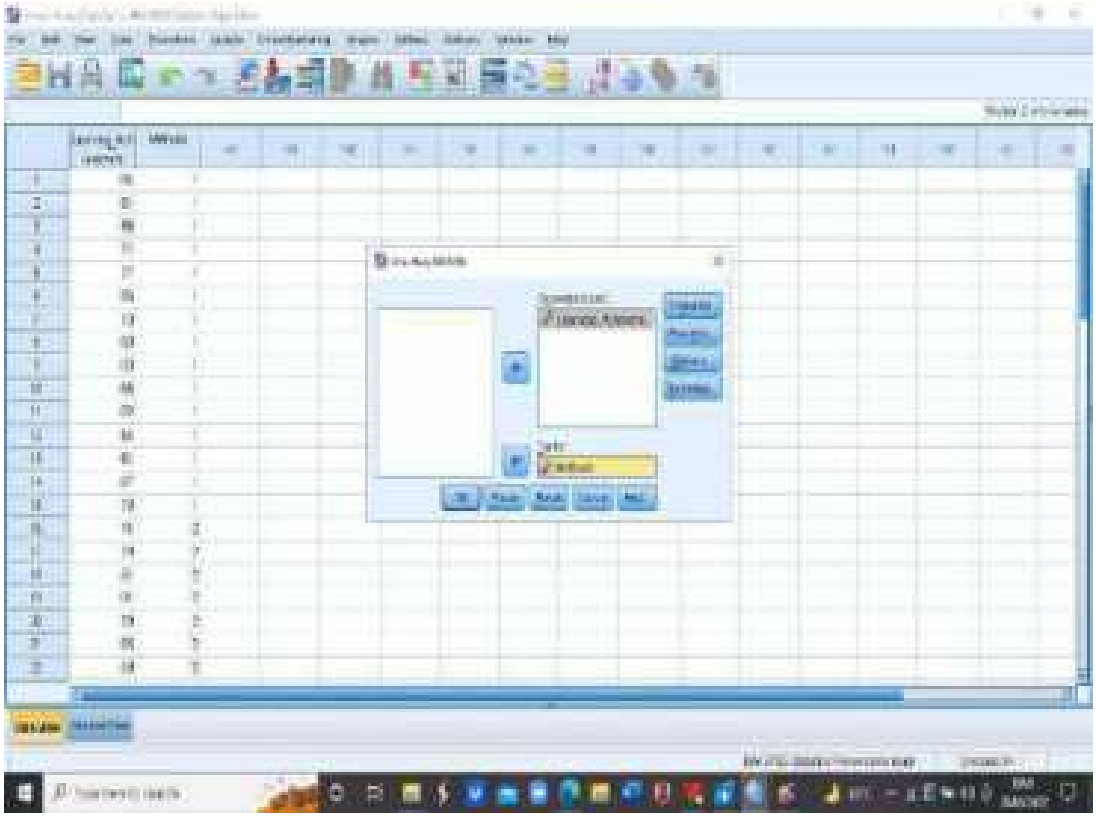
a. Lilliefors Significance Correction

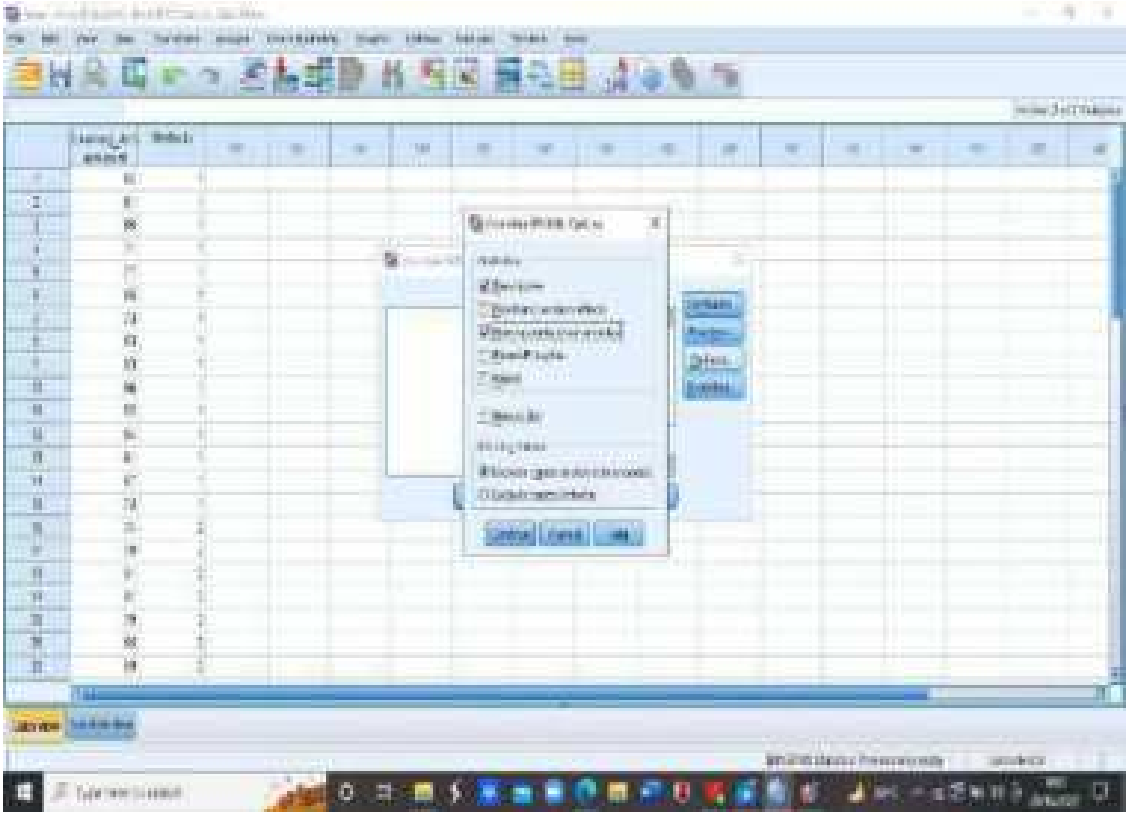
Test of Homogeneity of Variance

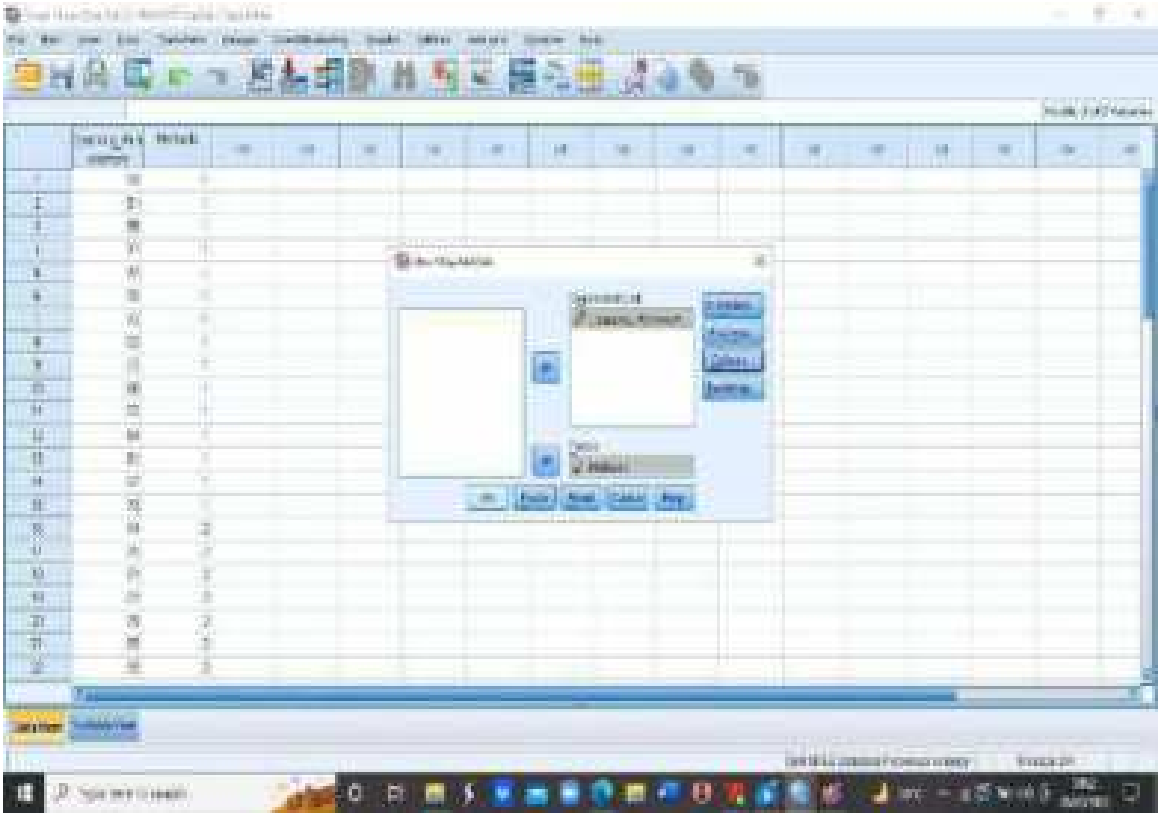
		Levene Statistic	df1	df2	Sig.
Learning_Achievement	Based on Mean	1.589	2	42	.216
	Based on Median	1.178	2	42	.318
	Based on Median and with adjusted df	1.178	2	40.109	.318
	Based on trimmed mean	1.575	2	42	.219

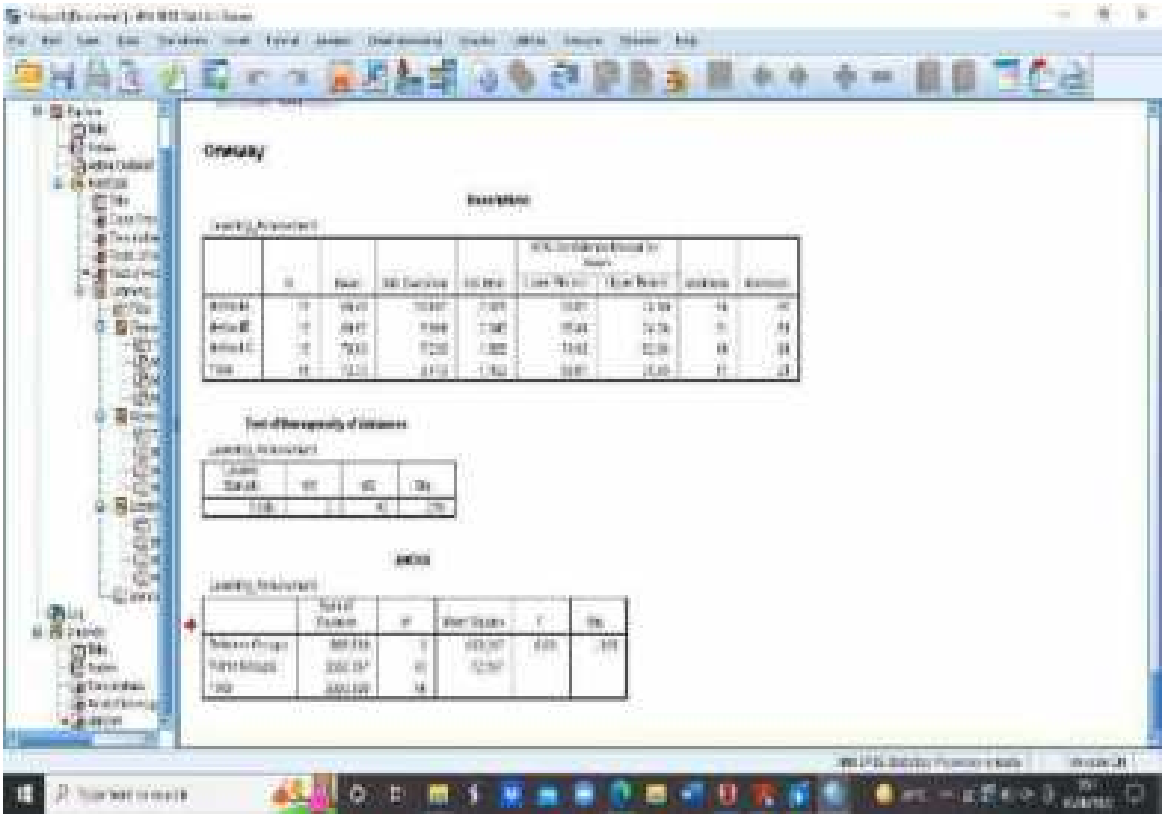
2. One Way Anova SPSS Output.










Oneway

ANOVA

Learning_Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	866.533	2	433.267	6.001	.005
Within Groups	3032.267	42	72.197		
Total	3898.800	44			

3. Conclusion

There are 2 ways to draw the conclusion,first using F table and F count ;second use significance value.

A. Hypothesis

Ho:There is no difference in learning achievement between the three learning methods.

Hi:There is a difference in learning achievement between the three learning methods.

B. Test Criteria:

1) using F table and F count

-If F count $\leq$ table then Ho is accepted

-If F count > F table the Ho is rejected

2) Use significance

-If sig $\geq$ 0.05 then Ho is accepted

-If sig < 0.05 then Ho is rejected

C. Conclusions

1) Using F table and F count

-Define F atble

The table can be seen in the statistical book at significance of 0.05 with df1=2 and df2=42.the result is an F table of 3.220.

-Comparing F table and F count

From the SPSS one way ANOVA output ,it is known that F count is 6.001. The Calculated F value > F table (6,001> 3.220) then Ho is rejected .So, it can be concluded that there are differences in learning achievement among the three learning methods.

(Check the average learning achievement of each method in the descriptive table in the one way ANOVA output)

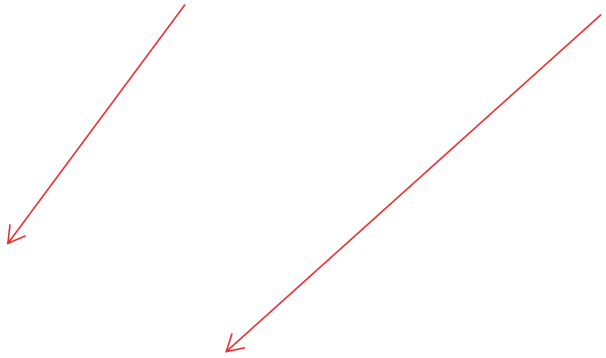
2) using significance value.

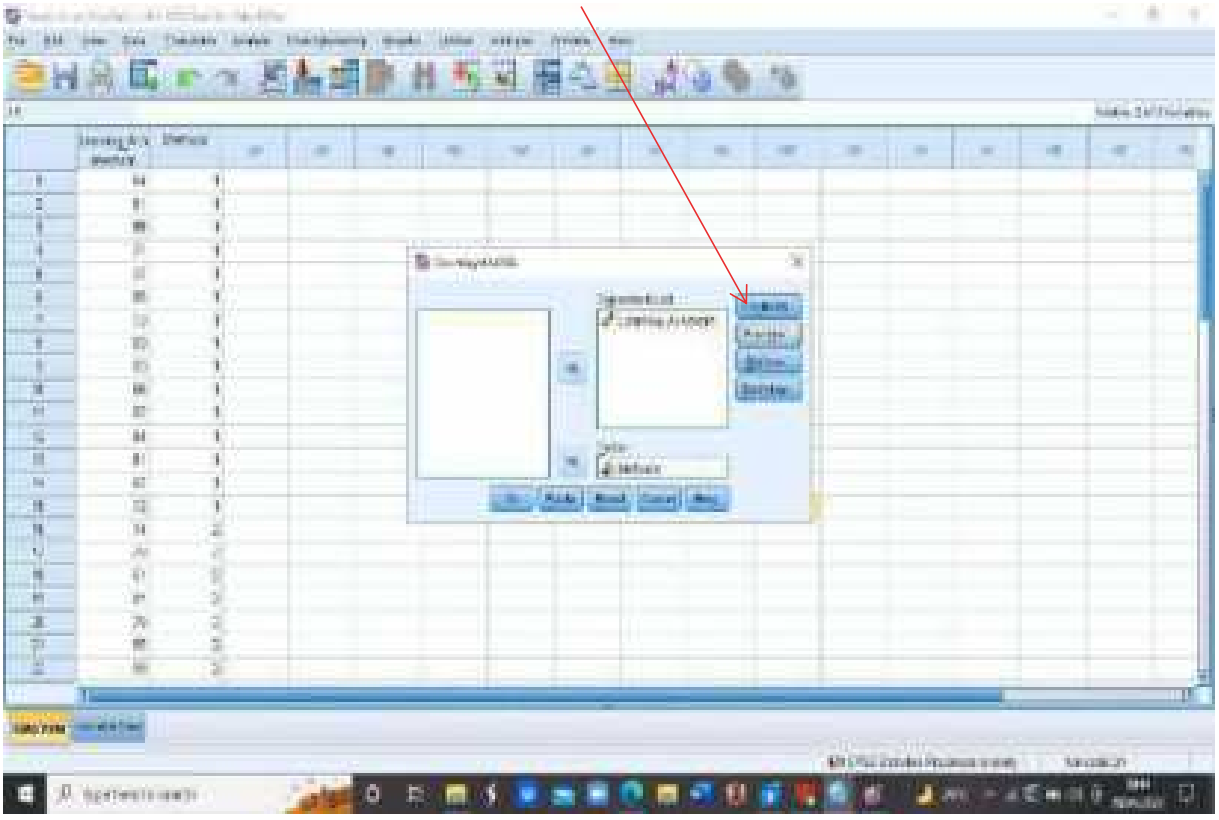
From the SPSS one way ANOVA output ,it is known that sig. Of 0.005.Because 0.005 <0.005 ,then Ho is rejected.So, it can be concluded that there are differences in learning achievement among the three learning methods.(check the average learning).

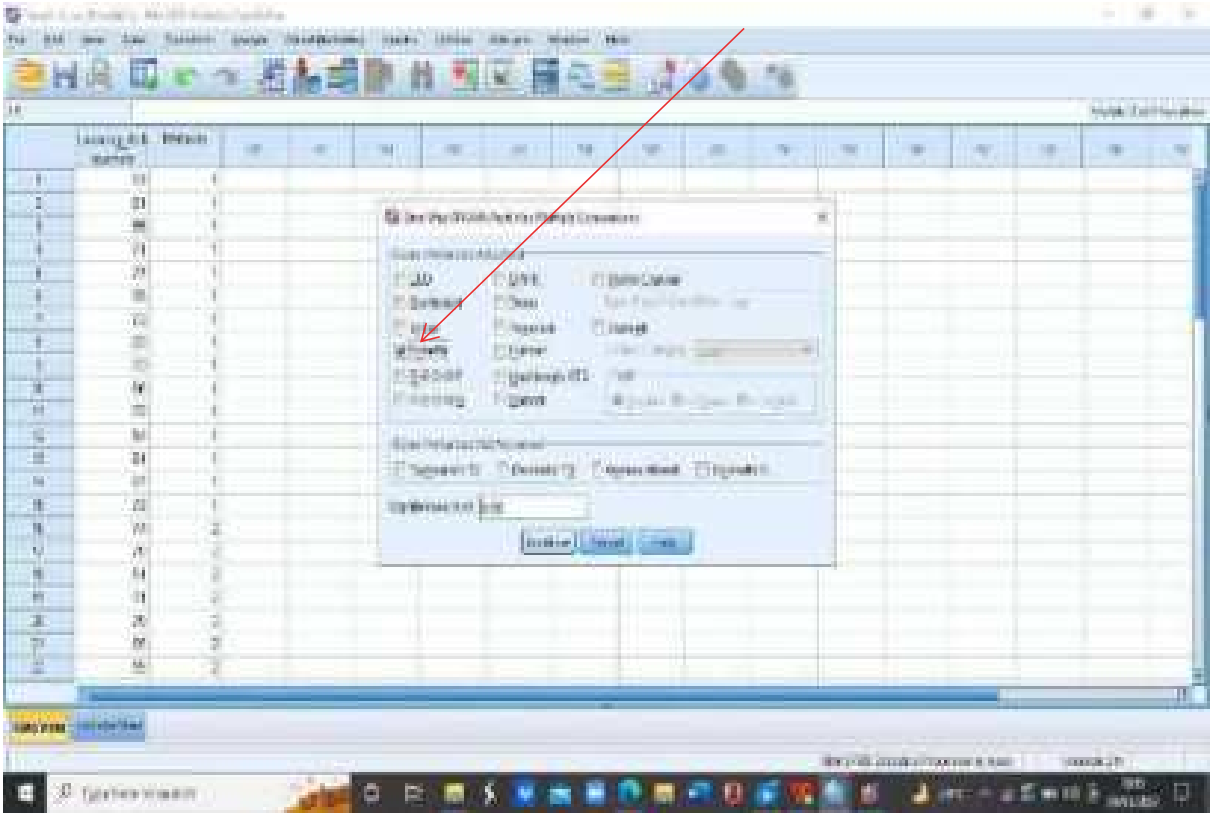
Achievement rate of each method in the descriptive table in the one way ANOVA output)

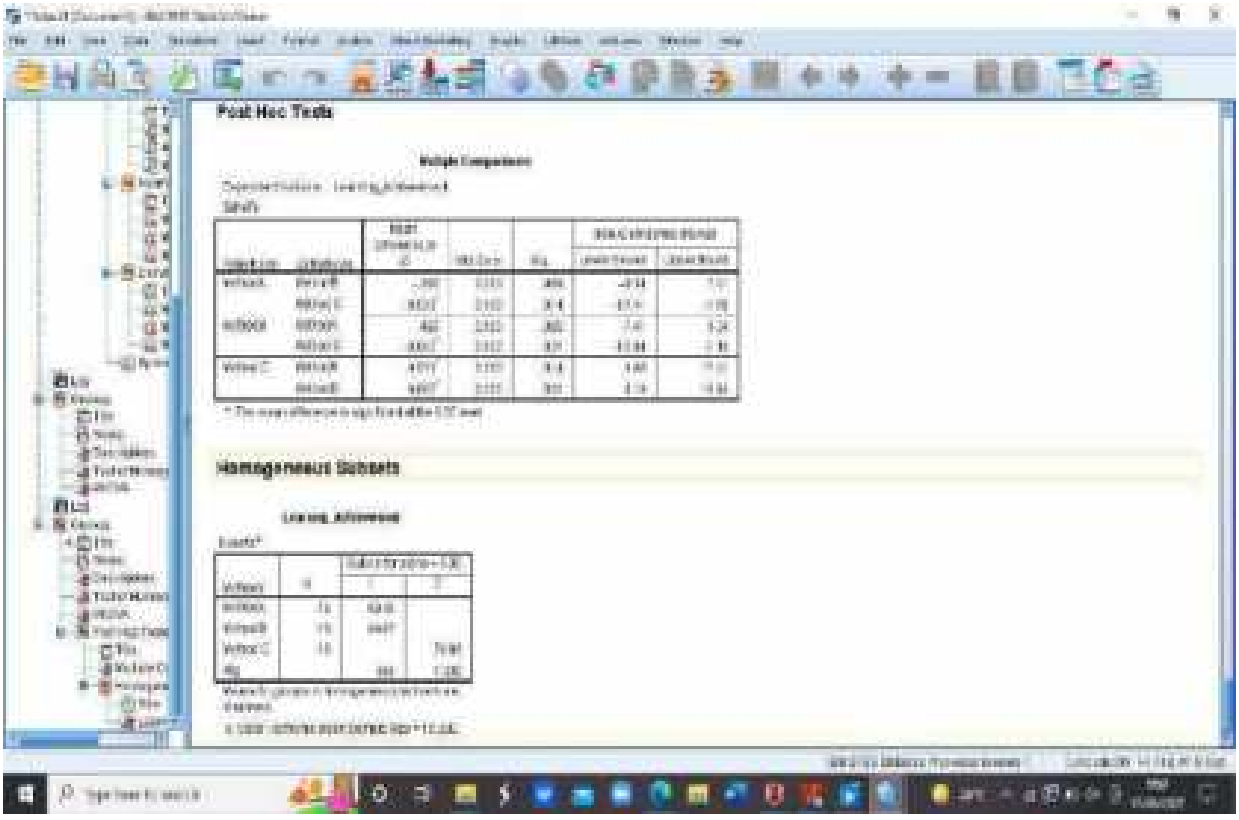
Since Ho was rejected ,it was continued with a further ANOVA test (post hoc) to find out which of the methods were significantly different from the others ANOVA further test used ,for example Scheffe test.

Scheffe test








Post Hoc Tests
Multiple Comparisons
Scheffe
Homogeneous Subsets

Multiple Comparisons

Dependent Variable: Learning_Achievement

Scheffe

(I) Methods	(J) Methods	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
MethodA	MethodB	-.467	3.103	.989	-8.34	7.41
	Method C	-9.533*	3.103	.014	-17.41	-1.66
MethodB	MethodA	.467	3.103	.989	-7.41	8.34
	Method C	-9.067*	3.103	.021	-16.94	-1.19
Method C	MethodA	9.533*	3.103	.014	1.66	17.41
	MethodB	9.067*	3.103	.021	1.19	16.94

*. The mean difference is significant at the 0.05 level.

Sig.>0.05 no difference

Sig.< 0.05 there is a difference (see the section on the mean difference marked with asterisk)

Conclusion :

A) There is no difference in learning achievement between those taught using method A and method B .

B) There is a difference in learning achievement between those taught using method A and method C. the learning achievement taught using method C is higher than those taught using method A.

D.)There is a difference in learning achievement between those taught using method B and method C. The learning achievement taught using method C is higher than those taught using method B.

18. TUTORIAL & PRACTICE
TWO WAY ANOVA PART 1

Two way Anova

1. test the difference in the mean parameters of one dependent variable for more than two sample groups.
2. Two -way analysis of variance consists of two factors with two or more levels.
3. Example:

The effect of learning model and self- efficacy ability on English teaching practice achievement (Field, 2005; Friedrich et al., 2017; Ioan, 2016; Iskandar et al., 2017; Oliver-Rodríguez & Wang, 2015; Solutions, 1918; Wilmot & Mansell, 2014).

.

- ✓ Factor 1:Learning model with three levels :Standford Microteaching Model (SMM),Microteaching Lesson study (MLS) ,and Tadaluring Microteaching Learning Model (TMLM)
- ✓ Factor 2:Self -efficacy ability with two levels :high and low
- ✓ Teaching practice achievement is the dependent variable.

Example of manual calculation:

This study aims to study the effect of learning models and self efficacy abilities on the practice of teaching English in the Microteaching class,for this purpose , three groups of random samples were taken to study using the Standfor Microteaching Learning Model(A1),Microteaching Lesson study (A 2),and Tadaluring Microteaching Learning Model (A3),Each group was randomly divided into two and divided into two based on self-efficacy abilities,namely the high group (B1), and the low group (B2).The score for the practice of teaching English is pretended as follows .

Learning Model (A)	Self -efficacy (B)	
	High(B)	Low(B2)
Standford Microteaching Model (A1)	85	69
	80	66
	90	69
	85	66
	90	69
	85	69
	80	68
	85	68
	80	68
	78	69
	79	
Microteaching Lesson self-efficacy	91	69
	89	65
	85	
	80	
	79	

	80	
	80	
	75	
	70	
	75	
	80	
	80	
	80	
	85	
Tadaluring Microteaching Learning Model (A3)	85	69
	90	69
	85	68
	90	65
	80	60
	85	69
	85	65
	80	60
	85	
	75	
	75	
	80	

1. Create research hypotheses with learning Ho and Hi

Research hypotheses with learning model factors

Ho(A) :There is no difference in the achievement of teaching English practice between propective teacher students who are taught with Standford Microteaching Model (SMM).Microtecahing Lesson Study(MLS),and Tadaluring Microteaching Learning Model(TMLM) ,in Microteaching class.

Hi (A) :There is a difference in the achievement of teaching English practice between prospective teacher students who are taught using Standford Microteaching Model (SMM).

Microteaching Lesson Study(MLS),and Tadaluring Microteaching Learning Model (TMLM) in Microteaching class .

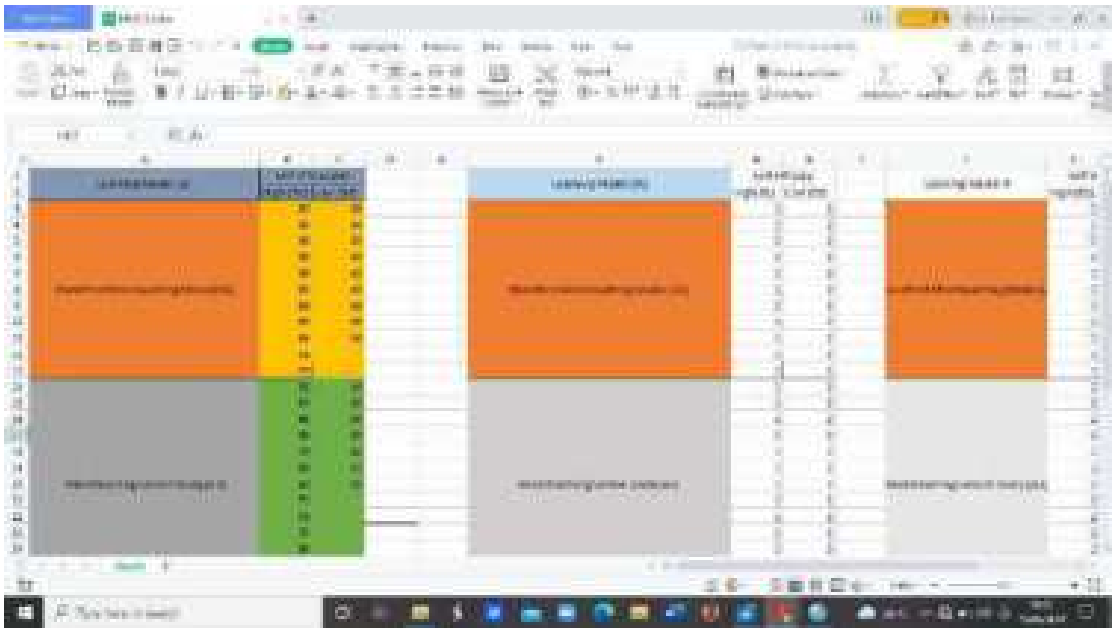
Research Hypotheses with self-efficacy ability factor

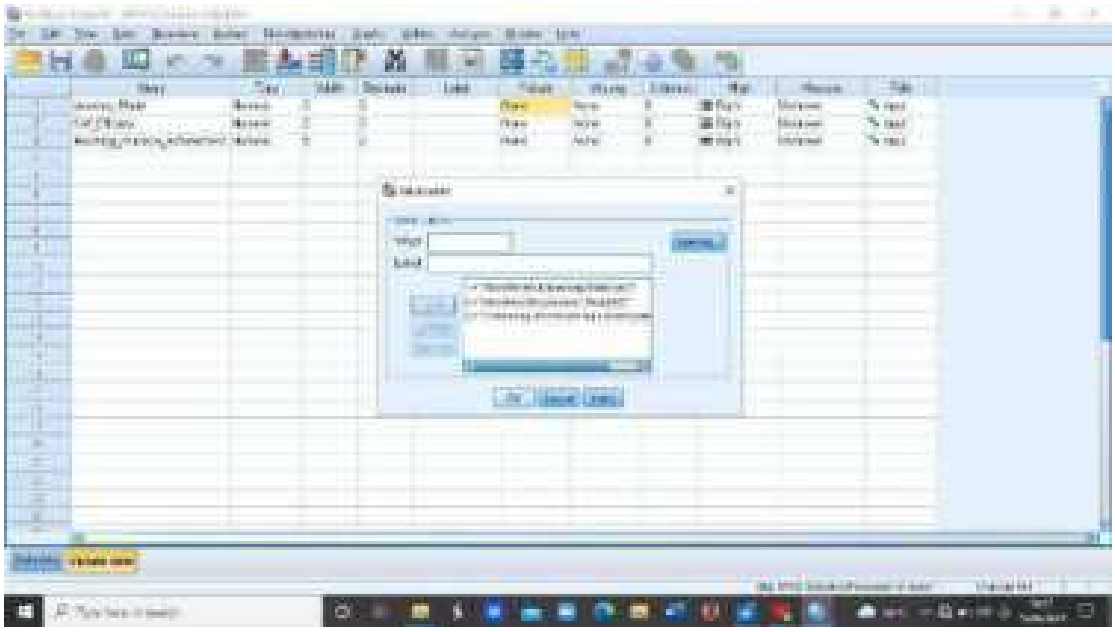
Ho(B) :There is no difference in the practical achievement of tecahing English between student teacher candidates who have high and low self-efficay abilities in Microteaching class.

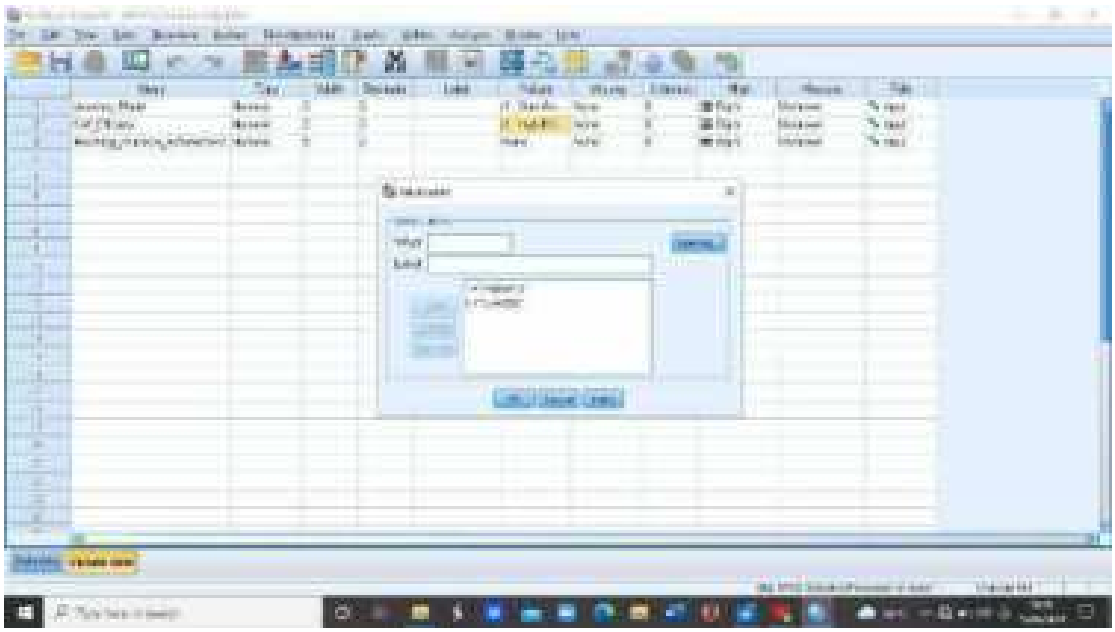
Research Hypothesis on the interaction of learning models with self-efficacy

Ho(AB) :There is no interaction of achievement in teaching English practice between students who have high and low self-efficacy who are taught with standford Microteaching Model (SMM) ,Microteaching Lesson study (MLS),and Tadaluring Microteaching Learning Model (TMLM)in Microteaching Class.

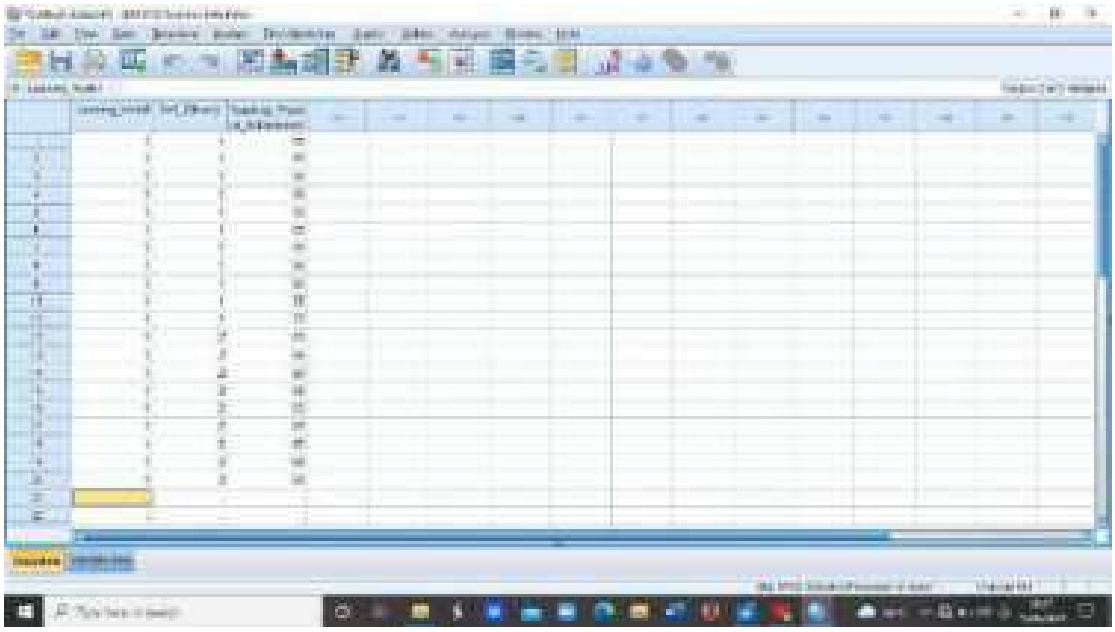
Type the data in ms excel

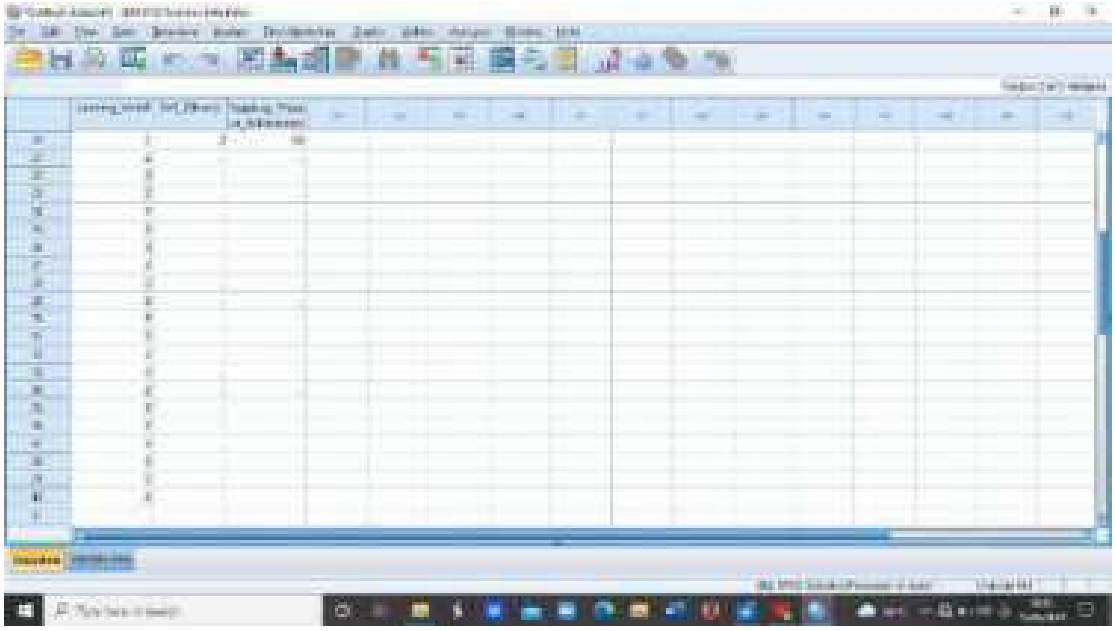


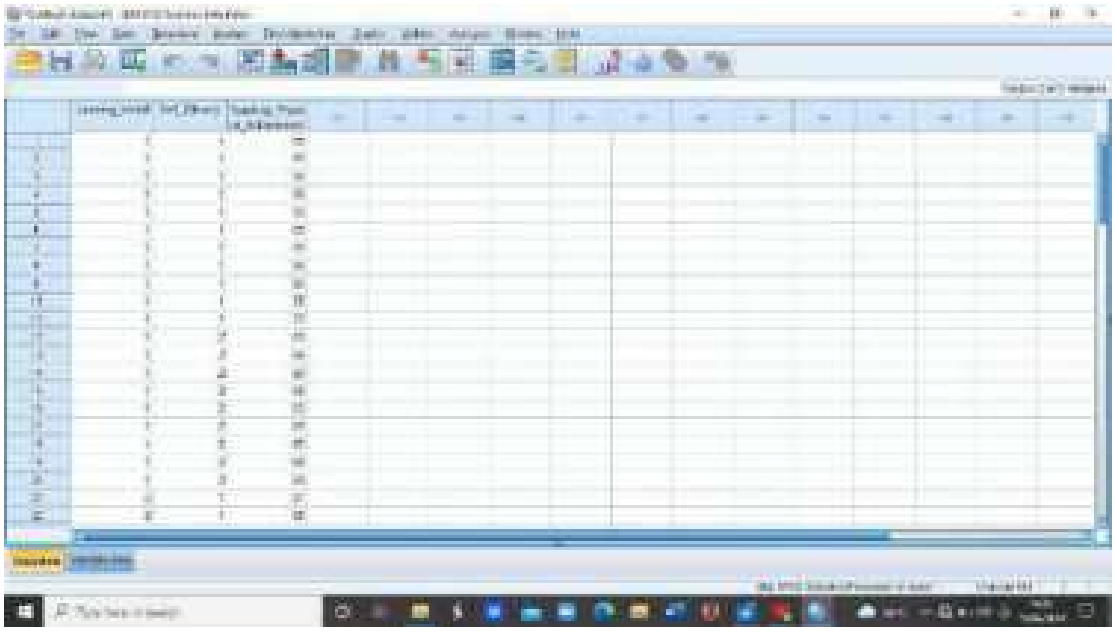


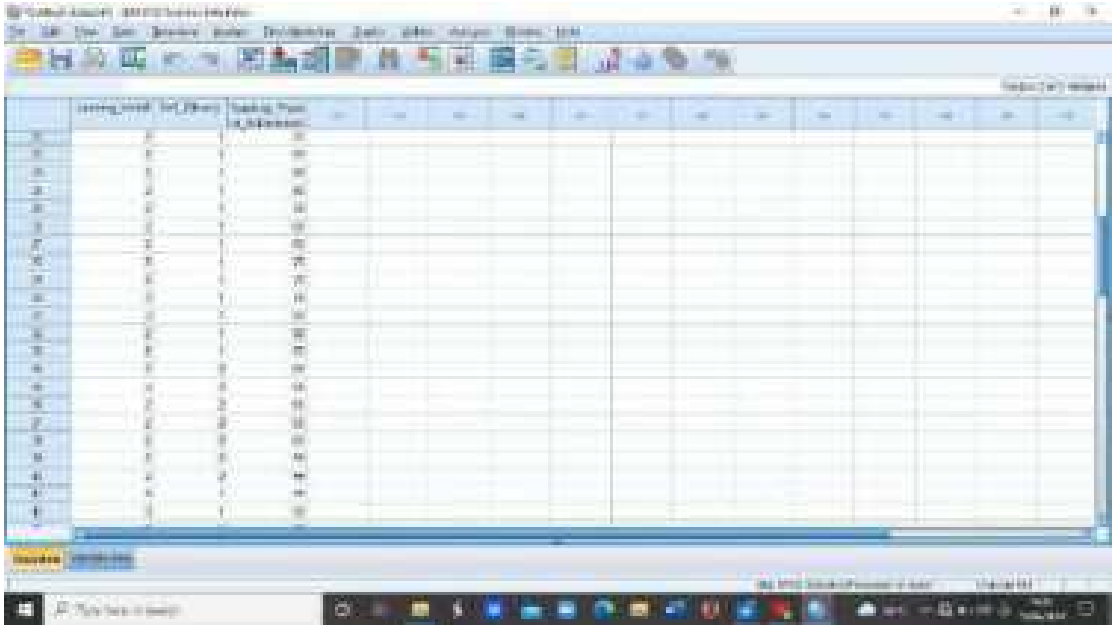


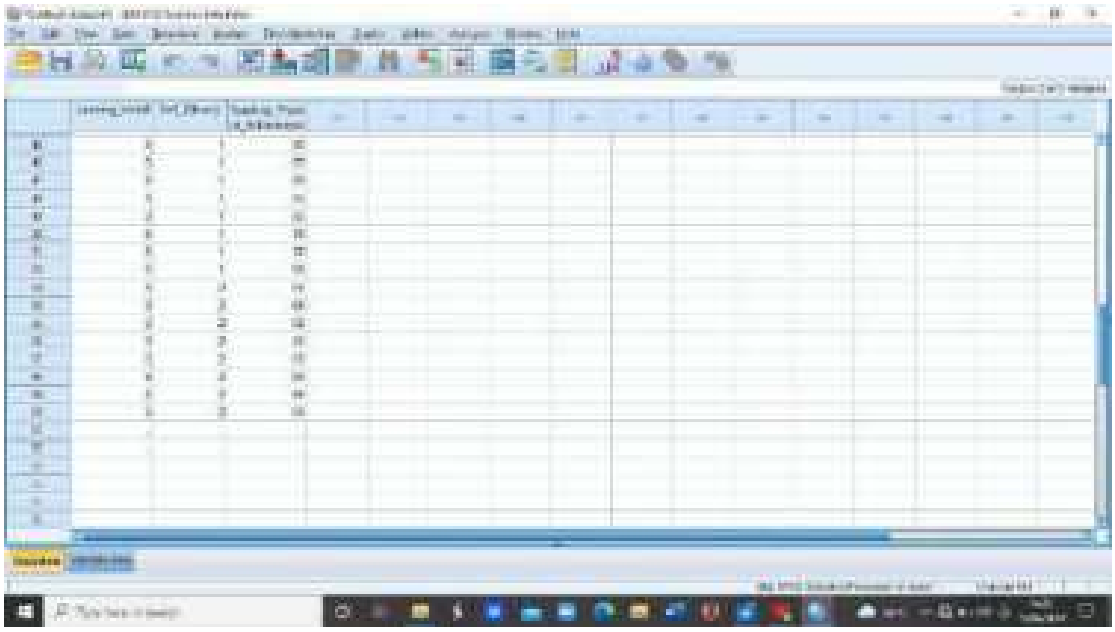
Copy and Paste the data from Excel to SPSS



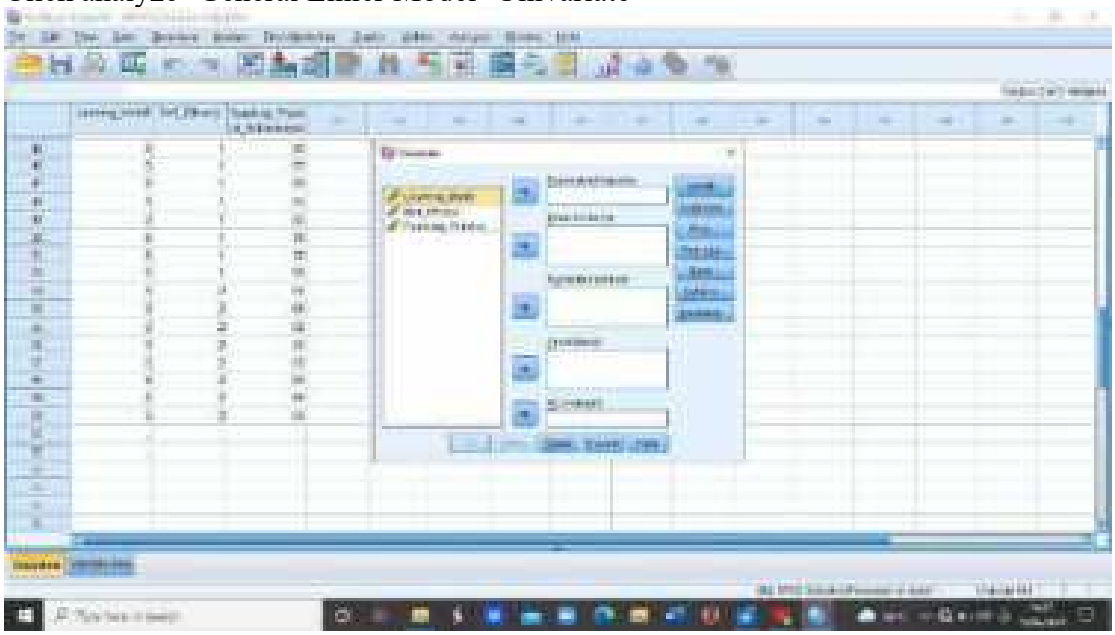




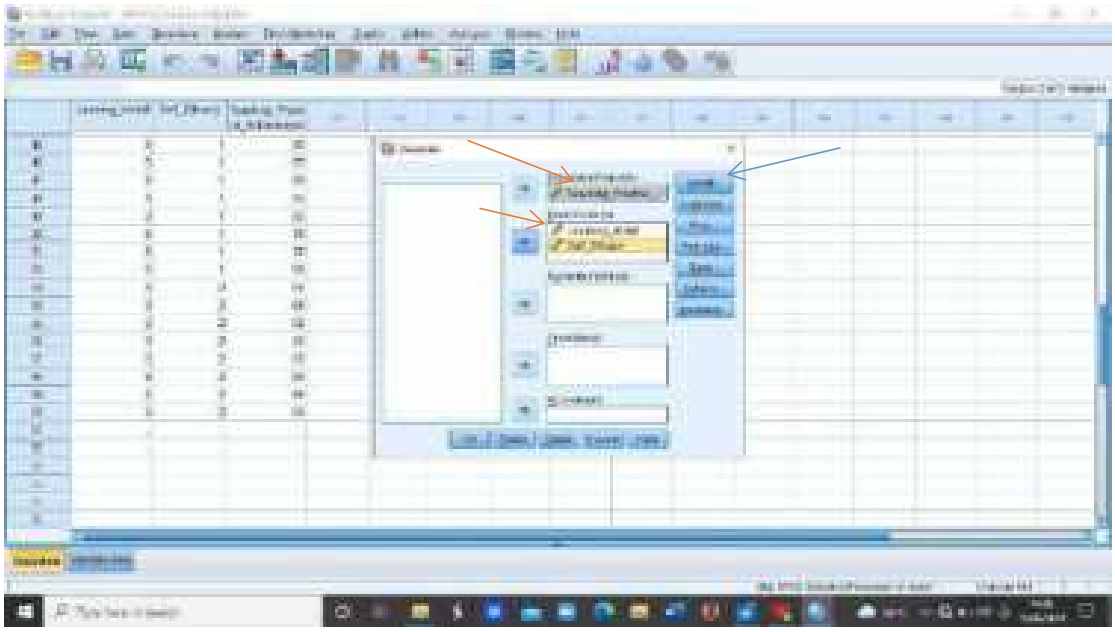




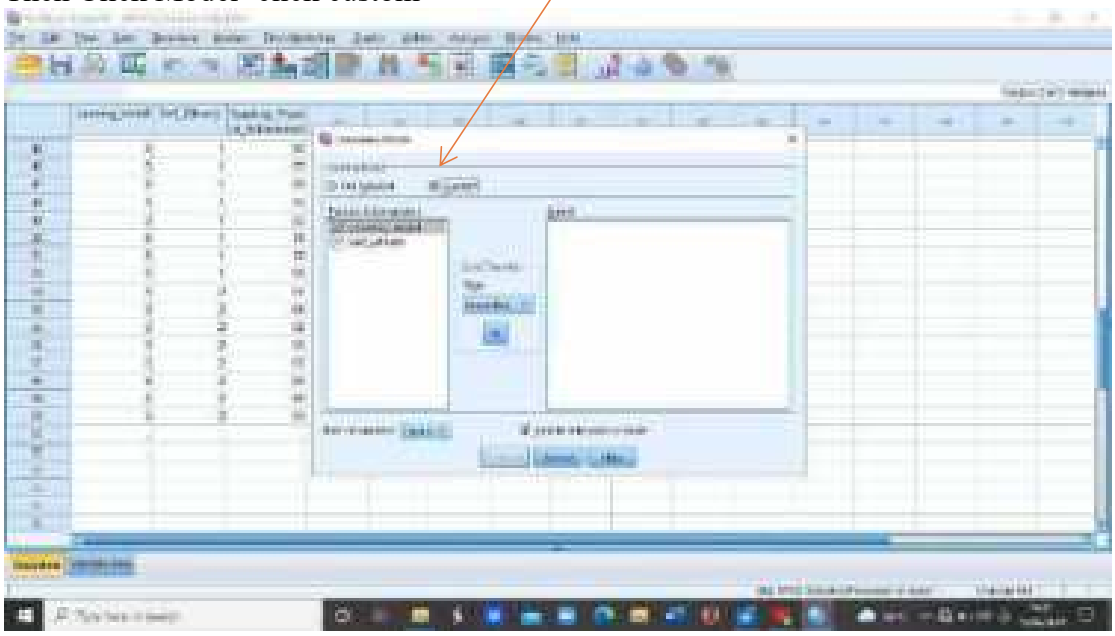
Go to SPSS
Click analyze -General Linier Model -Univariate

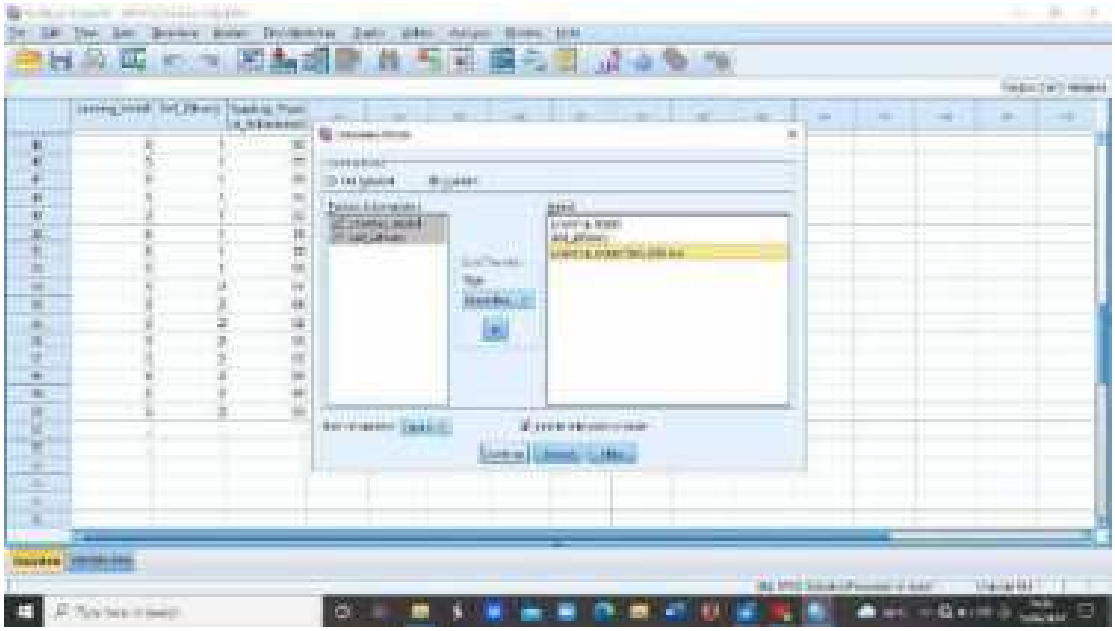


Move Teaching _practice to dependent variable on the right.
Move Learning _Model and Self Efficacy To Fixed factor(S) on the right.

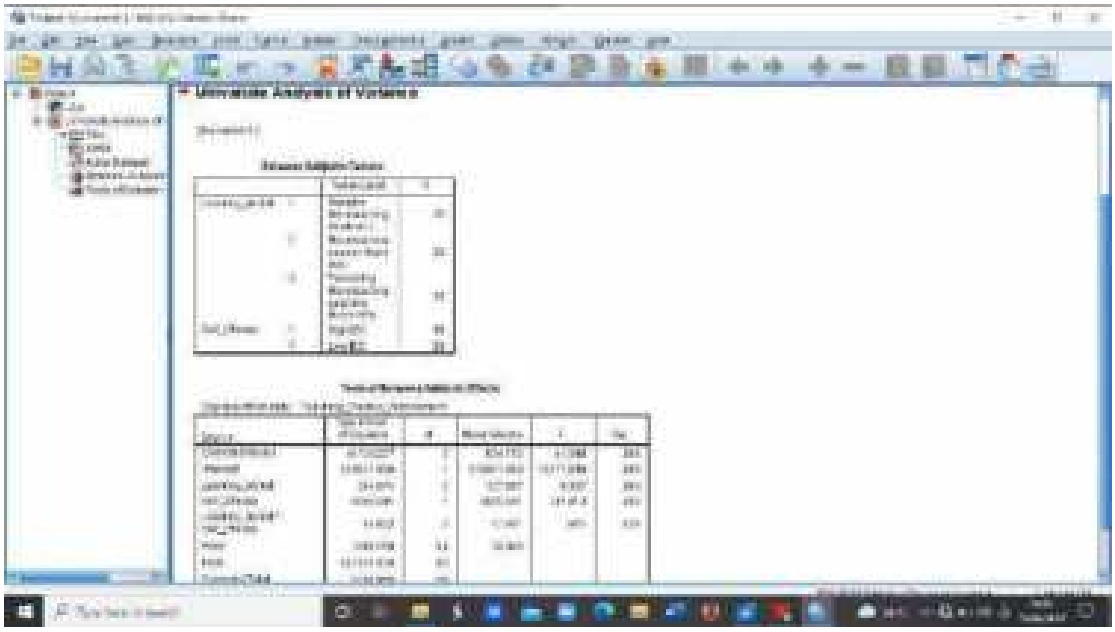


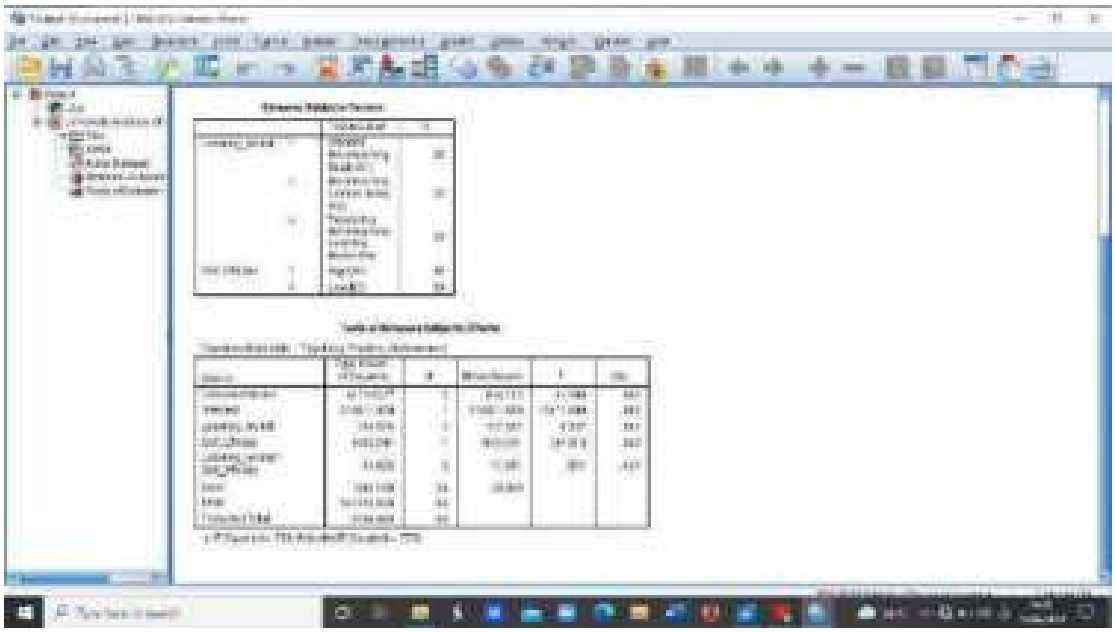
Then Click Model- click custom





Output





Between-Subjects Factors

		Value Label	N
Learning_Model	1	Standfor Microteaching Study (A1)	20
	2	Microteaching Lesson Study(A2)	20
	3	Tadaluring Microteaching Learning Model (A3)	20
Self_Efficacy	1	High(B1)	36
	2	Low(B2)	24

Tests of Between-Subjects Effects

Dependent Variable: Teaching_Practice_Achievement

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4173.823[a]	5	834.765	41.540	.000
Intercept	310911.369	1	310911.369	15471.649	.000
Learning_Model	254.674	2	127.337	6.337	.003

Self_Efficacy	4055.541	1	4055.541	201.813	.000
Learning_Model * Self_Efficacy	34.602	2	17.301	.861	.428
Error	1085.160	54	20.096		
Total	347425.000	60			
Corrected Total	5258.983	59			

a. R Squared = .794 (Adjusted R Squared = .775)

Conclusion

1. Learning Model

Fcount =6.337
Ftable=3.170
Fcount>Ftable,then Ho is rejected ,meaning that there is a difference in the achievement of teaching English practice which is taught using Standford Microteaching Model(SMM),Microteaching Lesson Study(MLS),and Tadaluring Microteaching Learning Model (TMLM) in Microteaching class.

2. Self -Efficacy Ability

F count =201.813
Ftable=4.020
Fcount>Ftable,then Ho is rejected meaning that there is a difference in English teaching practice achievement between student teacher candidates who have high and low self-efficacy abilities.

Or

Significance level 0.05
The significance of the test results p=0.003
The significance of the test results (sig)<significance level (0.003< 0.05),then Ho is rejected ,meaning that there is a difference in English teaching practice achievement between student teacher candidates who have high and low -self efficacy abilities.

3. Interaction of learning model with self -efficacy ability

f count=0.861
Ftable=3.170
Fcount<ftable ,then Ho is rejected ,which means that there is no interaction of teaching English practice achievement between student teacher candidates who have high and low self-efficacy abilities who are taught Standford Microteaching

Model(SMM),Microteaching Lesson Study(MLS),and Tadaluring Microteaching Class.

Or
Significance level 0.05
The significance of the test results p=0.428
The significance of the test results (sig)<significance level (0.428 > 0.05),then Ho is accepted ,meaning that there is no interaction between teaching English practice achievement student who have high and low self-efficacy abilities who are taught with Standford Microteaching Model(SMM),Microteaching Lesson Study (MLS),and Tadaluring Microtecahing Learning Model (TMLM) in Microteaching class.

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